



# WESTERN VASCULAR SOCIETY

## **32nd Annual Meeting**

September 23 – 26, 2017

Semiahmoo Resort | Blaine, WA

[westernvascularsociety.org](http://westernvascularsociety.org)

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# OFFICERS AND COMMITTEES

## OFFICERS

Steven Katz, MD	President
E. John Harris, MD	President-Elect
William C. Pevec, MD	Past President
York N. Hsiang, M.B., MHSc	Secretary-Treasurer
Michael Conte, MD	Recorder
Larry W. Kraiss, MD	Councilor
Peter A. Schneider, MD	Councilor

## PROGRAM COMMITTEE

Mark Sarfati, MD	Chair
Wei Zhou, MD	
Stephen Murray, MD	
Vincent Rowe, MD	
William C. Pevec, MD	President (Ex-Officio)
Steven Katz, MD	President-Elect (Ex-Officio)
York N. Hsiang, M.B., MHSc	Secretary-Treasurer (Ex-Officio)
Michael Conte, MD	Recorder (Ex-Officio)

## MEMBERSHIP COMMITTEE

Spencer Galt, MD	
Misty Humphries, MD	
William Lee, MD	
York N. Hsiang, M.B., MHSc	Secretary-Treasurer (Ex-Officio)

## WVS REPRESENTATIVE TO THE SVS

Roy Fujitani, MD	
York N. Hsiang, M.B., MHSc	

## LOCAL ARRANGEMENTS COMMITTEE

Sherene Shalhub, MD	
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## PAST MEETINGS

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, UT	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, Hawaii	Ronald L. Dalman, MD
2012	Park City, UT	William J. Quinones-Baldrich, MD
2013	Jasper, AB, Canada	Joseph L. Mills, Sr., MD
2014	Coronado, CA	Peter A. Schneider, MD
2015	Wailea, Hawaii	Larry Kraiss, MD
2016	Colorado Springs, CO	William Pevac, MD

## SECRETARY-TREASURERS

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

## RECORDERS

1987 - 1989	Victor M. Bernhard, MD
1989 - 1992	Eugene F. Bernstein, MD
1992 - 1995	Peter F. Lawrence, MD
1995 - 1998	William C. Krupski, MD
1998 - 2001	Roy L. Tawes, MD
2001 - 2004	Ronald L. Dalman, MD
2004 - 2007	Peter A. Schneider, MD
2007 - 2010	William C. Pevac, MD
2010 - 2013	Steven Katz, MD
2013 - 2017	Benjamin W. Starnes, MD
2017 - 2018	Michael Conte, MD

## NEW MEMBERS ELECTED IN 2016

**George Berni, MD**

**Warren Gasper, MD**

**Benjamin Brooke, MD**

**Kay Goshima, MD**

**John G. Carson, MD**

**Nii-Kabu Kabutey, MD**

**Travis Engelbert, MD**

**Brian D. Matteson, MD**

**Steven Farley, MD**

**Christian J. Ochoa, MD**

**Joy Garg, MD**

**Adnan (Addi) Rizvi, MD**

## WVS PRESIDENTIAL GUEST LECTURERS

1986 **Emerick Szilagyi**

2004 **None**

1987 **None**

2005 **Kevin G. Burnand**

1988 **James Stanley**

2006 **Jean Pierre Becquemin**

1989 **Brian Thiele**

2007 **None**

1990 **Frank Veith**

2008 **John H. N. Wolfe**

1991 **Allan Callow**

2009 **Jack L. Cronenwett**

1992 **Malcolm Perry**

2010 **None**

1993 **Norman Hertzner**

2011 **Germano Melissano**

1994 **Norman Browse**

2012 **Roy K. Greenberg**

1995 **Calvin Ernst**

**Hazim J. Safi**

1996 **Anthony Whittemore**

2013 **Spence M. Taylor**

1997 **None**

2014 **Alan B. Lumsden**

1998 **None**

2015 **Peter Gloviczki**

1999 **Jonathan Towne**

2016 **Alik Farber**

2000 **R. Thomas Grayston**

2017 **Bruce Perler**

2001 **William Hiatt**

2002 **Thomas R. Russell**

2003 **None**

## **GENERAL INFORMATION**

### **EDUCATIONAL OBJECTIVES & METHODS**

The 32nd 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.

### **OVERALL LEARNING OBJECTIVES**

This activity is designed for: vascular surgeons, fellows, residents, and general surgeons who find the art and science of vascular surgery rapidly changing with respect to scientific discovery and surgical technology. Reflecting this rapid advancement, the meeting will feature oral scientific presentations by members, sponsored guests, and residents. Special sessions this year are an afternoon session featuring a RPVI Symposium and Mock Oral Examinations.

Upon completion of this course, participants will be able to:

- Discuss and describe procedural planning, surgical techniques and outcomes of endovascular repair of complex thoracoabdominal, pararenal, and ruptured aortic aneurysms.
- Discuss long term outcomes, mortality rates and predictors of mortality following repair of aortic aneurysm.
- Describe techniques to treat endoleak following endovascular aneurysm repair.
- Discuss the role and outcomes of endovascular repair of aortic dissection.
- Describe strategies to reduce spinal cord ischemia from endovascular repair of thoracic aortic aneurysm.
- Explain the relationship between patient frailty and outcomes following vascular surgical intervention.

## **GENERAL INFORMATION** continued

- Describe techniques to optimize patient outcomes in the medical and surgical treatment of peripheral artery disease.
- Implement new techniques for the creation and maintenance of hemodialysis fistulas.
- Discuss new scientific insights into the biology of lipids, atherosclerotic plaque and peripheral artery disease.
- Describe new strategies to prevent venous thromboembolic disease.
- Discuss the diagnosis, management and outcomes of lower extremity arterial injury.
- Discuss techniques and outcomes of endarterectomy and stenting for symptomatic and asymptomatic carotid occlusive disease.
- Describe causes of finger ischemia in hospitalized patients.
- Recognize predictors of blood pressure response to renal artery stenting.
- Implement strategies to reduce radiation exposure during endovascular intervention.

## **EDUCATIONAL METHODS**

Authored papers are supported by PowerPoint presentations or ePoster sessions. Full 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.

## CONTINUING MEDICAL EDUCATION INFORMATION

### 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 (ACCME) through the joint providership of the American College of Surgeons and 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 **13.25** *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 **9.50** credits meet the requirements for Self-Assessment.



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## INSTRUCTIONS FOR CME CREDIT COLLECTION

To claim the 13.25 *AMA PRA Category 1 Credits™* please sign in each day at the registration desk and complete an evaluation form. At the end of the meeting each physician who returns the meeting evaluation form to the registration desk will be emailed a CME Certificate.

To claim the 9.5 *AMA PRA Category 1 Credits™* for Self-Assessment please check your email for the link to the online self-assessment quiz and complete the quiz within 10 days of the program.

For those attending the RPVI Symposium on Monday you will be given a separate AMA CME certificate for 2 credit hours to acknowledge your participation in this program.

## ACKNOWLEDGEMENTS

The Western Vascular Society wishes to thank the following companies for their educational grants in support of the 32nd Annual Meeting.

**Cook Medical**

**Gore & Associates, Inc.**

**Medtronic**

The Western Vascular Society wishes to thank the following companies for exhibiting in support of the 32nd Annual Meeting.

### PLATINUM

**Abbott Vascular**

**Cook Medical**

**Gore & Associates**

**Medtronic**

### GOLD

**Getinge Group**

**LifeNet Health**

### SILVER

**Boston Scientific**

**Bolton Medical**

**Endologix, Inc.**

**Penumbra**

**Silk Road Medical**

**Vascular Insights**



# **SCHEDULE OF EVENTS**

## SCHEDULE AT A GLANCE

### SATURDAY, SEPTEMBER 23, 2017

<i>12:00 p.m. – 8:00 p.m.</i>	<b>Registration Open</b> , Prefunction Foyer
<i>1:00 p.m. – 4:00 p.m.</i>	<b>Executive Council Meeting</b> , Board Room
<i>5:00 p.m. – 6:00 p.m.</i>	<b>ePoster Competition</b> , Ballroom Foyer
<i>6:00 p.m. – 7:30 p.m.</i>	<b>Welcome Reception</b> , Orcas Room

### SUNDAY, SEPTEMBER 24, 2017

<i>6:00 a.m. – 2:00 p.m.</i>	<b>Registration Open</b> , Prefunction Foyer
<i>7:00 a.m. – 1:00 p.m.</i>	<b>Exhibits Open</b> , Orcas Room
<i>7:00 a.m. – 7:45 a.m.</i>	<b>Continental Breakfast with Educational Exhibitors</b> , Orcas Room
<i>8:00 a.m. – 8:10 a.m.</i>	<b>Call to Order and Opening Announcements</b> , Blakely/Cypress
<i>8:10 a.m. – 10:00 a.m.</i>	<b>Scientific Session I</b> , Blakely/Cypress
<i>10:00 a.m. – 10:30 a.m.</i>	<b>Coffee Break</b> , Orcas Room
<i>10:30 a.m. – 12:30 p.m.</i>	<b>Scientific Session II</b> , Blakely/Cypress
<i>12:30 p.m. – 1:30 p.m.</i>	<b>Diversity and Women in Vascular Surgery Luncheon</b> , Seaside Room
<i>12:30 p.m. – 1:30 p.m.</i>	<b>Industry Satellite Symposium – No CME Credit Planning and Sizing Thoracic Stent Grafts - Timothy Chuter, MD</b> , Victoria Room
<i>1:00 p.m. – 4:30 p.m.</i>	<b>Golf Tournament</b> , Loomis Trail Golf Course
<i>1:30 p.m. – 3:30 p.m.</i>	<b>Tennis Tournament</b> , Tennis Courts
<i>5:30 p.m. – 7:30 p.m.</i>	<b>Western Barbeque</b> , Beachside

## SCHEDULE AT A GLANCE continued

### MONDAY, SEPTEMBER 25, 2017

<i>6:00 a.m. – 1:00 p.m.</i>	<b>Registration</b> , Prefunction Foyer
<i>7:00 a.m. – 1:00 p.m.</i>	<b>Exhibits Open</b> , Orcas Room
<i>7:00 a.m. – 8:00 a.m.</i>	<b>Continental Breakfast with Educational Exhibitors</b> , Orcas Room
<i>7:00 a.m. – 8:00 a.m.</i>	<b>Industry Satellite Symposium – No CME Credit</b> <b>Expert Strategies for Percutaneous Large Bore Closure - Peter Schneider, MD</b>
<i>8:00 a.m. – 9:30 a.m.</i>	<b>Scientific Session III</b> , Blakely/Cypress
<i>9:30 a.m. – 10:00 a.m.</i>	<b>Coffee Break</b> , Orcas Room
<i>10:00 a.m. – 11:30 a.m.</i>	<b>Scientific Session IV</b> , Blakely/Cypress
<i>11:30 a.m. – 12:15 p.m.</i>	<b>Presidential Guest Lecture - Bruce Perler, MD, MBA</b> , Blakely/Cypress
<i>12:20 p.m. – 12:30 p.m.</i>	<b>American Board of Surgery Update - Vincent L. Rowe, MD</b> , Blakely/Cypress
<i>12:35 p.m. – 1:00 p.m.</i>	<b>WVS Business Meeting</b> Blakely/Cypress
<i>1:30 p.m. – 3:30 p.m.</i>	<b>RPVI Ultrasound Review Symposium</b> <b>Dennis Bandyk, MD Moderator</b> , Blakely/Cypress
<i>3:30 p.m. – 5:30 p.m.</i>	<b>Trainee Symposium: Mock Oral Board Examinations</b> , Susanna Shin, MD, Moderator
<i>6:30 p.m. – 7:30 p.m.</i>	<b>Reception</b> , Pavilion
<i>7:30 p.m. – 10:00 p.m.</i>	<b>Western Vascular Society President's Banquet with Entertainment with Black and White Theme and Entertainment by Mentalist Bro Gilbert</b> , Pavilion

## SCHEDULE AT A GLANCE continued

### TUESDAY, SEPTEMBER 26, 2017

<i>7:00 a.m. – 1:00 p.m.</i>	<b>Registration Open</b> , Prefunction Foyer
<i>7:00 a.m. – 1:00 p.m.</i>	<b>Exhibits Open</b> , Orcas Room
<i>7:00 a.m. – 8:00 a.m.</i>	<b>Continental Breakfast with Educational Exhibitors</b> , Orcas Room
<i>7:30 a.m. – 9:00 a.m.</i>	<b>Scientific Session V</b> , Blakely/Cypress
<i>9:00 a.m. – 9:30 a.m.</i>	<b>Coffee Break</b> , Orcas Room
<i>9:30 a.m. – 10:50 a.m.</i>	<b>Scientific Session VI</b> , Blakely/Cypress
<i>10:50 a.m.</i>	<b>Meeting Adjourns</b>

## **INSTRUCTIONS TO AUTHORS**

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

### **FULL PRESENTATIONS**

8 minutes presentation, 2 minutes invited discussant

### **MINI PRESENTATIONS**

5 minutes presentation, 5 minute general discussion

### **POSTER PRESENTATIONS**

2 minutes presentation, and 3 minutes discussion

### **ROBERT HYE MEMORIAL BEST RESIDENT PRESENTATIONS**

8 minutes presentation, 2 minutes invited discussant

### **INVITED DISCUSSION**

Two minutes and specifically critique the paper as presented. Visual aids may not be incorporated into the discussion. An electronic copy of the discussion is required to be submitted to the recorder.

### **AUDIO-VISUAL**

Authors are to provide their presentation to the technician one (1) hour prior to the beginning of the Session in which they are to present.

C Sherman AV may be contacted for any technical challenges by calling 360-708-4226 or emailing [cs@cshermanav.com](mailto:cs@cshermanav.com).

## INSTRUCTIONS TO AUTHORS continued

### MANUSCRIPTS

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

The guidelines for submission of your Manuscript(s) may be found on the Journal of Vascular Surgery Publications website [www.editorialmanager.com/jvs](http://www.editorialmanager.com/jvs). Please refer to the “Instructions for Authors.” Once the manuscript is submitted to the Journal by email, please send a confirmation of submission to Michael Conte, MD at [Michael.Conte2@ucsf.edu](mailto:Michael.Conte2@ucsf.edu).

The Annual Meeting Registration Desk will be located in the Semiahmoo Ballroom Foyer, and open during the following hours:

<b>Saturday, September 23</b>	<b>12:00 p.m. – 8:00 p.m.</b>
<b>Sunday, September 24</b>	<b>6:00 a.m. – 2:00 p.m.</b>
<b>Monday, September 25</b>	<b>6:00 a.m. – 1:00 p.m.</b>
<b>Tuesday, September 26</b>	<b>7:00 a.m. – 11:00 a.m.</b>





# SCIENTIFIC PROGRAM

## SATURDAY, SEPTEMBER 23, 2017

12:00 p.m. - 8:00 p.m.

### **Registration Open**

Prefunction Foyer

1:00 p.m. - 4:00 p.m.

### **Executive Council Meeting**

Board Room

5:00 p.m. - 6:00 p.m.

### **ePoster Competition**

Ballroom Foyer

5:05 p.m. - 5:10 p.m.

### **ePoster 2: Contemporary Reconstructive Vascular Procedures Augment Resectability of Primary and Recurrent Neoplasms**

*Ramsey S. Elsayed, MD, Michael E. Bowdish, MD, Sukgu M. Han, MD,  
Sung W. Ham, MD, Siamak Daneshmand, MD, Vincent Rowe, MD,  
Fred A. Weaver, MD*

Keck Medical Center of USC, Los Angeles, CA

5:10 p.m. - 5:15 p.m.

### **ePoster 3: Ultrasound-Accelerated Catheter-Directed Thrombolytic Therapy for Acute Pulmonary Embolism in Children**

*Lauren E. Jones, MS<sup>1</sup>, Elias Kfoury, MD<sup>1</sup>, Angela Echeverria, MD<sup>1</sup>,  
Carlos Bechara, MD<sup>2</sup>, Joseph Varon, MD<sup>3</sup>, Stanley M. Duchman, MD<sup>2</sup>,  
Peter H. Lin, MD<sup>1</sup>*

<sup>1</sup>Baylor College of Medicine, Houston, TX, <sup>2</sup>Houston Methodist Hospital, TX, <sup>3</sup>University of Texas Health Science Center, Houston, TX

5:15 p.m. - 5:20 p.m.

**ePoster 4: Aortic Neck Dilation is Safe and Not Associated with Adverse Outcomes Following Fenestrated EVAR**

*Sayed M. Qaderi, MD<sup>1</sup>, Nam T. Tran, MD<sup>2</sup>, Billi Tatum, RN<sup>2</sup>, Jan Blankensteijn, MD, PhD<sup>1</sup>, Niten Singh, MD<sup>2</sup>, Benjamin W. Starnes, MD<sup>2</sup>*

<sup>1</sup>VU Medical Center, Amsterdam, Netherlands, <sup>2</sup>University of Washington, Seattle, WA

5:20 p.m. - 5:25 p.m.

**ePoster 5: Cardiac Abnormalities Detected by Transthoracic Echocardiography in Patients with Type B Aortic Dissection**

*Alexander Taylor, MD, Rosario Freeman, MD, MS, Matthew Bartek, MD, MPH, Sherene Shalhub, MD, MPH*

University of Washington, Seattle, WA

5:25 p.m. - 5:30 p.m.

**ePoster 6: The Effects of Regional and General Anesthesia on Infrainguinal Bypass Surgery Outcomes**

*Michael D. Sgroi, MD, Graeme McFarland, MD, Matthew Mell, MD*  
Stanford University, CA

5:30 p.m. - 5:35 p.m.

**ePoster 7: Establishing Branch Angle Boundary Conditions in Fenestrated-Branched Endografts**

*Jamil A. Matthews, MD, MS, Matthew P. Sweet, MD, MS*

University of Washington School of Medicine, Seattle, WA

5:35 p.m. - 5:40 p.m.

**ePoster 8: Regional Nerve Block Versus Local Anesthesia for Arteriovenous Fistula Creation: A Comparison of Early Thrombosis and Fistula Maturation**

*Kelsey Gray, MD<sup>1</sup>, Abraham Korn, MD<sup>1</sup>, Corinne Jansen<sup>2</sup>, Joshua Zane<sup>3</sup>, Amy Kaji, MD, PhD<sup>1</sup>, Nina Bowens, MD<sup>1</sup>, Christian de Virgilio, MD<sup>1</sup>*

<sup>1</sup>Harbor UCLA, Torrance, CA, <sup>2</sup>UCLA David Geffen School of Medicine, Los Angeles, CA, <sup>3</sup>University of Washington, Torrance, CA

5:40 p.m. - 5:45 p.m.

**ePoster 9: Brachial Artery Vasoreactivity in Patients with Venous Thromboembolism**

*Elias Kfoury, MD<sup>1</sup>, Tamuru Okada, MD, PhD<sup>2</sup>, Carlos Bechara, MD<sup>3</sup>, Angela Echeverria, MD<sup>1</sup>, Joseph Varon, MD<sup>4</sup>, Peter Lin, MD<sup>1</sup>*

<sup>1</sup>Baylor College of Medicine, Houston, TX, <sup>2</sup>California Institute of Technology, Pasadena, CA, <sup>3</sup>Houston Methodist Hospital, Houston, TX, <sup>4</sup>University of Texas Health Science, Houston, TX

5:45 p.m. - 5:50 p.m.

**ePoster 10: Subjective vs. Objective Assessment of Surgical Proficiency During Vascular Anastomosis**

*Nestor Arita, MD<sup>1</sup>, Zulbaran Alejandro, BSc<sup>2</sup>, Hadi Rahemi, PhD<sup>1</sup>, Javad Razjouyan, PhD<sup>1</sup>, Bijan Najafi, PhD<sup>1</sup>, Joseph Mills, MD<sup>1</sup>, Ramyar Gilani, MD<sup>1</sup>*

<sup>1</sup>Baylor College of Medicine, Houston, TX, <sup>2</sup>Universidad Popular Autonoma del Estado de Puebla, Puebla, Mexico

6:00 p.m. - 7:30 p.m.

**Welcome Reception**

Orcas Room

**SUNDAY, SEPTEMBER 24, 2017**

*6:00 a.m. - 2:00 p.m.*

**Registration Open**

Prefunction Foyer

*7:00 a.m. - 1:00 p.m.*

**Exhibits Open**

Orcas Room

*7:00 a.m. - 7:45 a.m.*

**Continental Breakfast with Educational Exhibitors**

Orcas Room

*8:00 a.m. - 8:10 a.m.*

**Call to Order and Opening Announcements**

**by President Dr. Steven Katz**

Blakely/Cypress

*8:10 a.m. - 10:00 a.m.*

**Scientific Session I**

Moderators: Steven Katz, MD and Michael Conte, MD

Blakely/Cypress

*8:10 a.m. - 8:30 a.m.*

**1. Long-term Durability of Multi-Branched Endovascular Repair of Thoracoabdominal and Pararenal Aortic Aneurysms**

*Joy Walker, MD, Smita Kaushik, MS, Megan Hoffman, BA,  
Warren Gasper, MD, Jade Hiramoto, MD, Linda Reilly, MD,  
Timothy Chuter, MD*

University of California San Francisco, CA

*Invited Discussant: William Quinones-Baldrich, MD*

8:30 a.m. - 8:50 a.m.

**2. Complex EVAR is Associated with Higher Peri-Operative Mortality but Not Late-Mortality Compared to Infrarenal EVAR Amongst Octogenarians**

*Kenneth Tran, MD, Andy Lee, MD, Graeme McFarland, MD, Mike Sgroi, MD, Nathan Itoga, MD, Jason Lee, MD*

Stanford School of Medicine, CA

*Invited Discussant: Nii-Kabu Kabutey, MD*

8:50 a.m. - 9:10 a.m.

**3. First Report of Procedural and Perioperative Results in Patients Treated with Fenestrated EVAR Planned by Automated Software in a Physician Sponsored IDE Clinical Trial**

*Benjamin W. Starnes, MD, Billi Tatum, RN, Niten Singh, MD*

University of Washington, Seattle, WA

*Invited Discussant: Omid Jazaeri, MD*

9:10 a.m. - 9:20 a.m.

**4. Upper Extremity Arterial Access during Endovascular Aortic Repair**

*Cali Johnson, MD<sup>1</sup>, Sukgu M. Han, MD<sup>2</sup>, Eric C. Kuo, MD<sup>2</sup>, Sung W. Ham, MD<sup>2</sup>, Vincent L. Rowe, MD<sup>2</sup>, Fred A. Weaver, MD, MMM<sup>2</sup>*

<sup>1</sup>Vascular Surgery, University of Southern California, Los Angeles, CA,

<sup>2</sup>University of Southern California, Los Angeles, CA

9:20 a.m. - 9:40 a.m.

**\*5. Locoregional Anesthesia Offers Improved Outcomes Following Endovascular Repair of Ruptured Abdominal Aortic Aneurysms**

*Samuel L. Chen, MD, Matthew D. Whealon, MD, Nii-Kabu Kabutey, MD, Isabella J. Kuo, MD, Carlos E. Donayre, MD, Roy M. Fujitani, MD*

University of California, Irvine Medical Center, Orange, CA

*Invited Discussant: Jade Hiramoto, MD*

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

9:40 a.m. - 9:50 a.m.

**6. Role of Intraplaque Lipid in Plaque Vulnerability**

*Gayatri Raghuraman, PhD<sup>1</sup>, Mary Zuniga, BS<sup>1</sup>, LiXin Wang, MD<sup>1</sup>, Wei Zhou, MD<sup>2</sup>*

<sup>1</sup>VA Palo Alto Health Care System, Palo Alto, CA,

<sup>2</sup>University of Arizona, Tucson, AZ

9:50 a.m. - 10:00 a.m.

**7. Oral Supplementation with High Dose Fish Oil Alters Circulating Leukocyte Resolution Phenotype in Healthy Subjects and Patients with Peripheral Arterial Disease**

*Melinda S. Schaller, MD, Mian Chen, MD, Thomas Sorrentino, Giorgio Mottola, MD, Marlene Grenon, MD, Michael S. Conte, MD*

University of California, San Francisco, CA

10:00 a.m. - 10:30 a.m.

**Coffee Break**

Orcas Room

10:30 a.m. - 12:30 p.m.

**Scientific Session II**

Moderators: Steven Katz, MD and Mark Sarfati, MD

Blakely/Cypress

10:30 a.m. - 10:50 a.m.

**\*8. Long-Term Outcomes after Repair of Symptomatic Non-Ruptured Abdominal Aortic Aneurysms**

*Karen Trang, BS, Venita Chandra, MD, Whitt Virgin-Downey, BA, Jason T. Lee, MD, E. John Harris, MD, Ronald L. Dalman, MD, Matthew W. Mell, MD, MS*

Stanford School of Medicine, CA

*Invited Discussant: Nam Tran, MD*

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

10:50 a.m. - 11:10 a.m.

**\*9. Endosalvage Techniques: Long-Term Results of Perigraft Arterial Sac Embolization (PASE) Suggest Safety, Efficacy, and Durability**

*Andrew Barleben, MD, MPH<sup>1,2</sup>, Abid Mogannam, MD<sup>1</sup>,  
Meena Archie, MD<sup>3</sup>, John Lane<sup>1</sup>, William Quinones-Baldrich, MD<sup>3</sup>*

<sup>1</sup>UCSD, La Jolla, CA, <sup>2</sup>VA San Diego, San Diego, CA, <sup>3</sup>UCLA, Los Angeles, CA

*Invited Discussant: Fred Weaver, MD*

11:10 a.m. - 11:30 a.m.

**\*10. Open Thrombectomy of Arteriovenous Fistulas: Worth the Effort or Is It Time to Move On?**

*Amir A. Ghaffarian, Mark R. Sarfati, MD, FACS, Larry W. Kraiss, MD, FACS, Claire L. Griffin, MD, Brigitte K. Smith, MD, Graham Donald, MD, Benjamin S. Brooke, MD, PhD, FACS, Ragheed Al-Dulaimi MD*

University of Utah School of Medicine, Salt Lake City, UT

*Invited Discussant: Matthew Sweet, MD*

11:30 a.m. - 11:50 a.m.

**\*11. Influence of Arterial and Venous Size on Fistula Maturation and Use**

*Jonathan Misskey, MD, Ramin Hamidizadeh, BSc, Jerry Chen, MD, MSc, Jason Faulds, MD, MSc, Joel Gagnon, MD, York Hsiang, MD*

University of British Columbia, Vancouver, BC

*Invited Discussant: Warren Gasper, MD*

11:50 a.m. - 12:10 p.m.

**\*12. Survival Trends After IVC and Aortic Injuries in the US**

*Bernardino C. Branco, MD, FACS, Tashinga Musonza, MD, Michael Long, MD, Jayer Chung, MD, FACS, Samuel R. Todd, MD, FACS, Matthew J. Wall, Jr, MD, FACS, Joseph L. Mills Sr., MD, FACS, Ramyar Gilani, MD, FACS*

Baylor College of Medicine, Houston, TX

*Invited Discussant: Sherene Shalhub, MD*



*12:10 p.m. - 12:30 p.m.*

**\*13. Getting to Choosing Wisely: The Value of a PE  
Clinical Decision Tool to Enhance Appropriateness of Care**

*Hallie E. Baer, MD, Taylor D. Hicks, MD, Georges M. Haidar, MD,  
Maureen K. Sheehan, MD, Matthew J. Sideman, MD, Lori Pounds, MD,  
Mark G. Davies, MD, PhD, MBA*

University of Texas Health San Antonio, San Antonio, TX

*Invited Discussant: Benjamin Brooke, MD*

*1:00 p.m. - 4:30 p.m.*

**Shuttle Leaves for Golf Tournament at Loomis Trail Golf Course**  
Lobby

*1:30 p.m. - 3:30 p.m.*

**Tennis Tournament**

Tennis Courts

*5:30 p.m. - 7:30 p.m.*

**Western Barbeque**

Beachside

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

**MONDAY, SEPTEMBER 25, 2017***6:00 a.m. - 1:00 p.m.***Registration**

Prefunction Foyer

*7:00 a.m. - 1:00 p.m.***Exhibits Open**

Orcas Room

*7:30 a.m. - 8:00 a.m.***Continental Breakfast with Educational Exhibitors**

Orcas Room

*8:00 a.m. - 9:30 a.m.***Scientific Session III**

Moderators: Steven Katz, MD and Wei Zhou, MD

Blakely/Cypress

*8:00 a.m. - 8:20 a.m.***14. Outcomes of Thoracic Endovascular Aortic Repair (TEVAR) in Patients with Type B Aortic Dissection (TBAD) Enrolled in the Global Registry for Endovascular Aortic Treatment (GREAT)**

*Bruce L. Tjaden, Jr., MD<sup>1</sup>, Ali Azizzadeh, MD, FACS<sup>1</sup>,  
Dennis Gable, MD, FACS<sup>2</sup>, Santi Trimarchi, MD, PhD<sup>3</sup>,  
Charles Miller, PhD<sup>1</sup>, Harleen K. Sandhu, MD, MPH<sup>1</sup>,  
Fred Weaver, MD, MMM<sup>4</sup>*

<sup>1</sup>University of Texas Health Science Center at Houston, Houston, TX,<sup>2</sup>Baylor University Medical Center, Dallas, TX, <sup>3</sup>IRCCS Policlinico San Donato, Cardiovascular Center, San Donato Milanese, Italy, <sup>4</sup>University of Southern California, Los Angeles, CA*Invited Discussant: Carlos Donayre, MD**\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

8:20 a.m. - 8:30 a.m.

**15. The Role of Ascending Aortic Size in Outcomes of Patients with Uncomplicated Acute Type B Aortic Dissection**

*Hunter M. Ray, MD, Joseph M. Besho, MD, Jason Au, MD, Kristofer M. Charlton-Ouw, MD, Anthony L. Estrera, MD, Charles C. Miller, PhD, Hazim J. Safi, MD, Ali Azizzadeh, MD*

The University of Texas Medical School at Houston, Houston, TX

8:30 a.m. - 8:50 a.m.

**16. Utilization of Spinal Cord Protection Adjuncts in Thoracic Endovascular Aortic Repair**

*Jason Faulds, MD, Gary Yang, MD, Kyle Arsenault, MD, Jon Misskey, MD, Jerry Chen, MD, Charles Dong, MD, Michael Janusz, MD*

University of British Columbia, Vancouver, BC

*Invited Discussant: Jeffrey Ballard, MD*

8:50 a.m. - 9:10 a.m.

**\*17. Preoperative Frailty Assessment Predicts Loss of Independence Following Vascular Surgery**

*Graham W. Donald, MD, Farid Isaac, BA, Larry Kraiss, MD, FACS, Claire Griffin, MD, Brigitte Smith, MD, Mark Sarfati, MD, FACS, Julie Beckstrom, RN, MSN, Benjamin Brooke, MD, PhD, FACS*

University of Utah, Salt Lake City, UT

*Invited Discussant: Willis Wagner, MD*

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

9:10 a.m. - 9:30 a.m.

**18. Using Frailty and Cognitive Assessment to Predict Adverse Events after Major Vascular Intervention - Application of Wearable Technologies**

*Miguel Montero, MD Bijan Najafi, PhD, MSc, Vanessa Hinko, BSc, Simon Hoeglner, BSc, Hadi Rahemi, PhD, Ana Enriquez, BS, Jayar Chung, MD, Neal Barshes, MD, Ramyar Gilani, MD, Joseph Mills, MD*

Baylor College of Medicine, Houston, TX

*Invited Discussant: Ahmed Abou-Zamzam, MD*

9:30 a.m. - 10:00 a.m.

**Coffee Break**

Orcas Room

10:00 a.m. - 11:30 a.m.

**Scientific Session IV**

Moderators: Steven Katz, MD, York Hsiang, MD, MHSc  
Blakely/Cypress

10:10 a.m. - 10:30 a.m.

**\*19. Multidisciplinary Limb Salvage Service: Reducing Major Amputations in Diabetic Foot Infections**

*Eric Pillado, BS, Kimberly Lauer, FNP-C, Eli Ipp, MD, Richard A. Murphy, MD, MPH, Ashley Miller, DPM, Frederic Bongard, MD, JD*

Harbor-UCLA Medical Center, Torrance, CA

*Invited Discussant: Christian Ochoa, MD*

10:30 a.m. - 10:50 a.m.

**\*20. Evaluation of Near-Instant Non-invasive Optical Imaging of Tissue Perfusion for Vascular Assessment**

*Craig Weinkauf, MD, PhD<sup>1</sup>, Kairavi Vaishnav<sup>1</sup>, Brain Hoang, MD<sup>1</sup>, Amaan Mazhar, PhD<sup>2</sup>, David J. Cuccia, PhD<sup>2</sup>, David G. Armstrong, MD, PhD<sup>1</sup>*

<sup>1</sup>University of Arizona, Tucson, AZ, <sup>2</sup>Modulated Imaging Inc., Irvine, CA

*Invited Discussant: Charles Andersen, MD*

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

10:50 a.m. - 11:10 a.m.

**\*21. Optimal Medical Management Prior to Lower Extremity Bypass: Are We Achieving this Goal and Improving Outcomes?**

*Christopher Williams, MD, Angela Jellison, MD, Luke Martin, MD, Angela Presson, PhD, Chong Zhang, MS, Larry Kraiss, MD, FACS, Benjamin Brooke, MD, PhD, FACS*

University of Utah School of Medicine, Salt Lake City, UT

*Invited Discussant: Scott Musicant, MD*

11:10 a.m. - 11:20 a.m.

**22. Trends in Washington State Aortic-Related Deaths over a 21-year period, 1996 - 2016**

*Matthew A. Bartek, MD, MPH, Jennifer Talbot, Jimmy Nguyen, BA, Sherene Shalhub, MD, MPH*

University of Washington, Seattle, WA

11:20 a.m. - 11:30 a.m.

**23. Accuracy Evaluations of Three Ruptured Abdominal Aortic Aneurysm Mortality Risk Scores Using an Independent Data Set**

*Spencer K. Hansen, MD<sup>1</sup>, Patrick Danaher, PhD<sup>2</sup>, H. Whitt Hollis, Jr., MD<sup>1</sup>, Brandon Ty Garland, MD<sup>3</sup>*

<sup>1</sup>Saint Joseph Hospital, Denver, CO, <sup>2</sup>NanoString Technologies, Seattle, WA, <sup>3</sup>Vascular Institute of the Rockies, Denver, CO

11:30 a.m. - 12:15 p.m.

*Presidential Guest Lecture:*

**Evidence Based Medicine and the Contemporary Management of Carotid Artery Disease: After More than 60 Years the Controversies Continue - Bruce Perler, MD, MBA**

Blakely/Cypress

12:20 p.m. - 12:30 p.m.

**American Board of Surgery Update - Vincent L. Rowe, MD**

Blakely/Cypress

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

*12:35 p.m. - 1:00 p.m.*

**Western Vascular Society Annual Business Meeting - Members Only**

Blakely/Cypress

*1:30 p.m. - 3:30 p.m.*

**RPVI Ultrasound Review Symposium**

Dennis Bandyk, MD, Moderator

Blakely/Cypress

*3:30 p.m. - 5:30 p.m.*

**Trainee Symposium: Mock Oral Board Examinations**

Susanna Shin, MD, Moderator

*6:30 p.m. - 7:30 p.m.*

**Reception**

Pierside Wharf

*7:30 p.m. - 10:00 p.m.*

**Western Vascular Society Black and White Theme**

**President's Banquet with Entertainment by Mentalist Bro Gilbert**

Pavilion

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

**TUESDAY, SEPTEMBER 26, 2017**

*6:30 a.m. - 1:00 p.m.*

**Registration Open**

Prefunction Foyer

*7:00 a.m. - 1:00 p.m.*

**Exhibits Open**

Orcas Room

*7:00 a.m. - 8:00 a.m.*

**Continental Breakfast with Educational Exhibitors**

Orcas Room

*7:30 a.m. - 9:00 a.m.*

**Scientific Session V**

Moderators: E. John Harris, MD and Vincent Rowe, MD

Blakely/Cypress

*7:30 a.m. - 7:50 a.m.*

**24. Comparison of Cyanoacrylate (VenaSeal) and Radiofrequency Ablation for Treatment of Varicose Veins in a Canadian Population**

*Gary K. Yang, MD, Marina Parapini, MD, Joel Gagnon, MD,  
Jerry Chen, MD*

University of British Columbia, Vancouver, BC

*Invited Discussant: Brian Ferris, MD*

*7:50 a.m. - 8:00 a.m.*

**25. Pilot Study Evaluating the Efficacy of Exergaming for the Prevention of Deep Venous Thrombosis**

*Jayer Chung, MD, MSc, Hadi Rahemi, PhD, Vanessa Hinko, MSc,  
Simon Hoeglinger, MSc, Wendy A. Martinek, RN, RVT,  
Joseph L. Mills, Sr, MD, Bijan Najafi, PhD*

Baylor College of Medicine, Houston, TX

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

8:00 a.m. - 8:20 a.m.

**26. Validation of Preoperative Predictors of Blood Pressure Response to Renal Artery Stenting**

*J. Gregory Modrall, MD<sup>1</sup>, Hong Zhu, PhD<sup>1</sup>, Fred Weaver, MD<sup>2</sup>, Lance Dworkin, MD<sup>3</sup>, Donald Cutlip, MD<sup>4</sup>, Timothy Murphy, MD<sup>5</sup>, Christopher Cooper, MD<sup>3</sup>, Robert Toto, MD<sup>1</sup>*

<sup>1</sup>University of Texas Southwestern Medical Center, Dallas, TX,

<sup>2</sup>University of Southern California School of Medicine, Los Angeles, CA,

<sup>3</sup>University of Toledo, Toledo, OH, <sup>4</sup>Harvard Medical School, Boston, MA, <sup>5</sup>Brown University, Providence, RI

*Invited Discussant: Larry Kraiss, MD*

8:20 a.m. - 8:40 a.m.

**27. Causes and Outcomes of Finger Ischemia in Hospitalized Patients in the Intensive Care Unit**

*Gregory Landry, MD, Courtney Mostul, Bryan McLafferty, MD, Daniel Ahn, MD, Erica Mitchell, MD, Timothy Liem, MD, Enjae Jung, MD, Cherrie Abraham, MD, Amir Azarbal, MD, Gregory Moneta, MD*

Oregon Health & Science University, Portland, OR

*Invited Discussant: Niten Singh, MD*

8:40 a.m. - 9:00 a.m.

**28. Radiation Brain Dose to Vascular Surgeons During Fluoroscopically Guided Interventions is Not Effectively Reduced by Wearing Lead Equivalent Surgical Caps**

*Melissa L. Kirkwood, MD, Gary Arbique, PhD, Jeffrey Guild, PhD, Yin Xi, PhD, Katie Zeng, John Rectenwald, MD, Jon Anderson, PhD, Carlos Timaran, MD*

University of Texas Southwestern Medical Center, Dallas, TX

*Invited Discussant: Ryan Nachreiner, MD*

9:00 a.m. - 9:30 a.m.

**Coffee Break**

Orcas Room

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*



9:30 a.m. - 10:50 a.m.

## Scientific Session VI

Moderators: E. John Harris, MD and Roy Fujitani, MD  
Blakely/Cypress

9:30 a.m. - 9:50 a.m.

### 29. Very Early CEA Without Shunting for Stroke - The Preferred Therapy

*Niren Angle, MD, RVT, FACS*

East Bay Cardiovascular & Thoracic Associates, Danville, CA

*Invited Discussant: William Pevec, MD*

9:50 a.m. - 10:10 a.m.

### 30. Duration of Asymptomatic Status and Outcomes Following Carotid Endarterectomy and Carotid Artery Stenting in CREST

*Wesley S. Moore, MD<sup>1</sup>, Jenifer H. Voeks, PhD<sup>2</sup>, Gary S.*

*Roubin, MD, PhD<sup>3</sup>, Wayne M. Clark, MD<sup>4</sup>, Virginia J. Howard, PhD<sup>5</sup>,  
Michael R. Jones, MD<sup>6</sup>, Thomas G. Brott, MD<sup>7</sup>*

<sup>1</sup>UCLA Medical Center, Los Angeles, CA, <sup>2</sup>Medical University of South  
Carolina, Charleston, SC, <sup>3</sup>Cardiovascular Associates of the Southeast,  
Birmingham, AL, <sup>4</sup>Oregon Health Science University, Portland, OR,  
<sup>5</sup>University of Alabama at Birmingham, School of Public Health,  
Birmingham, CA, <sup>6</sup>Baptist Health Lexington, Lexington, KY,  
<sup>7</sup>Mayo Clinic, Jacksonville, FL

*Invited Discussant: Peter Schneider, MD*

10:10 a.m. - 10:30 a.m.

### 31. Episode-Based Cost Reduction for Endovascular Aneurysm Repair

*Ronald L. Dalman, MD<sup>1</sup>, Ning Tang, MD<sup>2</sup>, Diana Patterson<sup>2</sup>,  
Harnoor Jolly<sup>2</sup>, Rika Obkuma<sup>2</sup>, Matthew W. Mell, MD<sup>1</sup>*

<sup>1</sup>Stanford University, Stanford, CA, <sup>2</sup>Stanford Health Care,  
Stanford, CA

*Invited Discussant: Jerry Chen, MD*

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*

*10:30 a.m. - 10:40 a.m.*

**32. Incidence and Outcomes of Vascular Injury in the Setting of Tibial Plateau Fractures: A Single Center Review**

*Sarasijhaa K. Desikan, MD, Alan Swenson, MD, Jake Hemingway, Megan Terle, MD, Prince Esiobu, MD, Sherene Shalhub, MD, Niten Singh, MD, Nam Tran, MD, Elina Quiroga, MD*

University of Washington, Seattle, WA

*10:40 a.m. - 10:50 a.m.*

**33. Limb Salvage and Functional Limb Outcomes After Traumatic Acute Limb Ischemia**

*Shabram Aarabi, MD, MPH, David Emanuels, BS, Prince Esiobu, MD, Elina Quiroga, MD, Nam Tran, MD, Benjamin Starnes, MD, Niten Singh, MD*

University of Washington, Seattle, WA

*10:50 a.m.*

**Meeting Adjourns**

*\* Robert Hye Memorial Best Resident Presentation Award Competition Entry*



# **SCIENTIFIC SESSION ABSTRACTS**

## SCIENTIFIC SESSION ABSTRACTS

Presentation #1

### **Long-term Durability of Multi-Branched Endovascular Repair of Thoracoabdominal and Pararenal Aortic Aneurysms**

Joy Walker, MD, Smita Kaushik, MS, Megan Hoffman, BA,  
Warren Gasper, MD, Jade Hiramoto, MD, Linda Reilly, MD,  
Timothy Chuter, MD

UCSF, San Francisco, CA

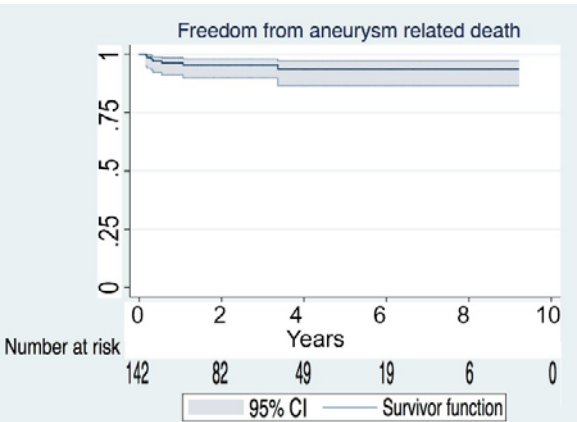
**Objective:** To assess the durability of multi-branched endovascular repair of thoracoabdominal (TAAA) and pararenal aortic aneurysms (PRAA) by examining the rates of late-occurring (30 day to 10 years) complications. **Methods:** 146 patients underwent endovascular TAAA repair using a stent graft with a total of 538 caudally-oriented self-expanding branches. Four patients, died in the perioperative period and were excluded, leaving 142 patients (mean age,  $73 \pm 8$  years, 35 [24.7%] women). Follow-up included clinical exam and CTA at 1, 6, and 12 months, and yearly thereafter.

**Results:** Mean aneurysm diameter was  $67 \pm 9$  mm. Sixty-seven TAAA (47.2%) were Crawford type I, II, III, or V; 75 (52.8%) were type IV or pararenal. Three patients (2.1%) died more than 30 days after operation from perioperative complications. During a mean follow-up of 36 months ( $\pm 28$  mo), there were 4 additional aneurysm-related deaths: one (0.7%), from aneurysm rupture in the presence of untreatable type I endoleak, 1 (0.7%) following conversion to open repair for stent graft infection, 1 (0.7%) following occlusion of SMA and celiac branches, and 1 (0.7%) due to sequela following late bilateral renal branch occlusion. There was one additional open conversion for stent graft infection (0.7%). Twenty patients (14.1%) underwent 21 re-interventions for late-occurring complications, including: 11 (7.7%) for renal branch occlusion/stenosis, 1 (0.7%) for mesenteric branch stenosis, 4 (2.8%) for graft limb occlusion, 2 (1.4%) for type IB endoleak (distal stent graft migration), and 1 (0.7%) for type III endoleak (fabric erosion). There were no late type IA endoleaks. By K-M analysis, freedom aneurysm-related death was 93.7%, and freedom from aneurysm-related death or re-intervention was 76.8% at 5 years (Figure 1). The 5-year overall survival rate of 50.5% reflects the high rate of cardiopulmonary co-morbidity. Although renal branch occlusion (21 occlusions of 256 renal branches, 8.2%) was the commonest late complication, only 5 patients required permanent dialysis.

SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** Total endovascular TAAA/PRAA repair using axially oriented cuffs is safe, effective, and durable in the long term. Most deaths resulted from perioperative complications. Only 4 (2.8%) patients suffered aneurysm-related deaths during a mean F/U of 3 years.

Figure 1. K-M Analysis: Freedom from Aneurysm-Related Death



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #2

### **Complex EVAR is Associated with Higher Peri-Operative Mortality but Not Late-Mortality Compared to Infrarenal EVAR Amongst Octogenarians**

Kenneth Tran, MD, Andy Lee, MD, Graeme McFarland, MD,  
Mike Sgroi, MD, Nathan Itoga, MD, Jason Lee, MD

Stanford University, Stanford, CA

**Objective:** An increasing number of elderly patients are being offered endovascular repair of juxtarenal aneurysms. We sought to evaluate outcomes following complex EVAR compared to infrarenal EVAR in a cohort of octogenarians.

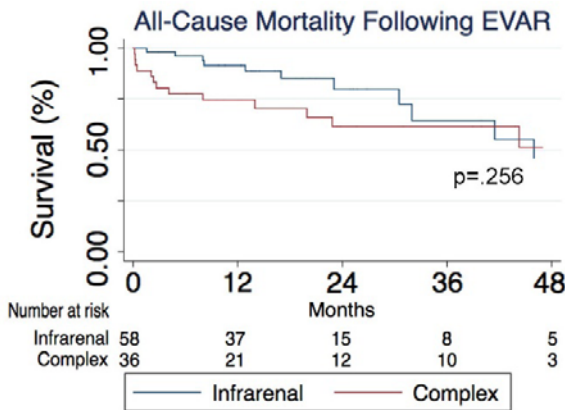
**Methods:** A single-center retrospective review was conducted with a database of consecutive patients treated with elective EVAR for AAAs between 2009-2015. Only patients  $\geq 80$  years of age were included. The complex EVAR group was treated with either snorkel (Sn-EVAR) or fenestrated (F-EVAR) techniques, whereas infrarenal EVAR consisted of aneurysm repair without renovisceral involvement. Relevant demographic, anatomic/device variables, and clinical outcomes were collected.

**Results:** 105 patients (69 infrarenal, 36 complex) were treated within the study period with a mean follow-up of 22 months. A total of 79 branch grafts were placed (61 renal, 11 celiac, 7 SMA) in the complex group, with a target vessel patency of 98.2% at latest follow-up. Patients with complex EVAR were more likely to be male (83.3% vs 61.1%,  $p=.019$ ) and have a higher prevalence of renal insufficiency (72.2% vs 44.5%,  $p=.008$ ). Thirty-day mortality was significantly more common in patients treated with complex EVAR (11.1% vs 0%,  $p=.012$ ). There were no significant differences in major adverse events ( $p=.795$ ) or late re-intervention ( $p=.232$ ) between groups. Interestingly, sac growth  $>10$ mm was noted to be more frequent with infrarenal EVAR (17.6% vs. 2.9%,  $p=.039$ ). However, both Type 1a (5.7% infrarenal; 5.0% complex) and Type II endoleaks (32.3% infrarenal; 25.7% complex) were found to be equally common in both groups. Complex EVAR was not associated with increased all-cause mortality at latest follow-up ( $p=.256$ , Figure 1). Multivariate cox modeling demonstrated that AAAs greater than 75mm in diameter (HR 5.1 [1.8-13.9]), and renal insufficiency (4.45 [1.27-15.6]) were the only independent risk factors of late death.

SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** Complex EVAR is associated with higher peri-operative mortality compared to infrarenal EVAR amongst octogenarians. However, late outcomes are not significantly different. Larger aneurysms and CKD portends greater risk of late-death following EVAR, regardless of AAA complexity. These patient-related factors should be considered when offering endovascular therapy to older patients.

Figure 1.



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #3

### **First Report of Procedural and Perioperative Results in Patients Treated with Fenestrated EVAR Planned by Automated Software in a Physician Sponsored IDE Clinical Trial**

Benjamin W. Starnes, MD, Billi Tatum, RN, Niten Singh, MD

University of Washington, Seattle, WA

**Objective:** To validate the use of automated planning software to design fenestrated endografts and treat patients with complex abdominal aortic aneurysms. Type 1a endoleak (T1aE) represents failure of the primary mode of therapy to treat juxtarenal abdominal aortic aneurysm (jAAA) with endovascular means. Fenestrated EVAR (FEVAR) is associated with low rates of T1aE and low rates of re-intervention. Barriers to wide adoption of FEVAR include complexity in planning.

**Methods:** Patients with jAAA who were not candidates for open repair were enrolled into one arm of an investigational device exemption clinical trial (#NCT01538056) and treated with FEVAR. Fenestration size and location were determined by automated planning software using patient imaging data and algorithms that account for the interaction between the endograft delivery system and angulated aortic anatomy. Endografts from multiple manufacturers were modified by the physician based on the graft plans and typically included fenestrations for the SMA and both renal arteries.

**Results:** Twenty-three patients were consented and treated with FEVAR planned by automated software. Procedural and perioperative data are in Table 1. 100% of the modified grafts were implanted with preservation of >95% of branch vessels at the index procedure. 30-day mortality rate in these high risk jAAA patients was 8.7% (2/23) and both deaths were unrelated to the aneurysm. 30-day MAE rate was 21.7% (5/23). There were no type 1a or type 3 endoleaks. Results are comparable to those based on manual planning by an experienced surgeon.

**Conclusions:** Once validated, automated planning software that accurately identifies fenestration locations for vital branch arteries removes a barrier to FEVAR adoption and could bring the therapy to most patients harboring juxtarenal abdominal aortic aneurysms.



## SCIENTIFIC SESSION ABSTRACTS continued

Table 1. Procedural and Perioperative Data

Measurement	Automated Planning Arm (n=23)
<b>Procedural</b>	
Modified Endografts Implanted (%)	100 (23/23)
Branch vessels preserved at index (%)	95.5 (63/66)
Maximum Aneurysm Diameter (mm)	59.3
Fenestrations / Patient	2.9
Infrarenal neck length to final circumferential seal zone length (mm)	6.5 to 41.5
Mean Operative Time (min)	158
Mean Fluoroscopy Time (min)	37
Mean Contrast Volume (ml)	105
Estimated Blood Loss (ml)	92
<b>Perioperative</b>	
ICU Length of Stay (days)	2.1
Hospital Length of Stay (days)	3.8
30-day Mortality (%)	8.7% (2/23)
30-day MAEs (%)	21.7% (5/23)
30-day Type 1a and 3 Endoleaks	0

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #4

### Upper Extremity Arterial Access during Endovascular Aortic Repair

Cali Johnson, MD<sup>1</sup>, Sukgu M. Han, MD<sup>2</sup>, Eric C. Kuo, MD<sup>2</sup>,  
Sung W. Ham, MD<sup>2</sup>, Vincent L. Rowe, MD<sup>2</sup>, Fred A. Weaver, MD, MMM<sup>2</sup>

<sup>1</sup>Vascular Surgery, University of Southern California, Los Angeles, CA,

<sup>2</sup>University of Southern California, Los Angeles, CA

**Objective:** To identify the incidence of complications associated with upper extremity access in patients undergoing endovascular aortic repair (EVAR) at a regional aortic center.

**Methods:** Patients who had upper extremity access during EVAR were identified from 2013 to 2016. In-hospital and clinic records were reviewed to identify upper extremity access indications, technique, and complications.

**Results:** Of 359 EVARs performed from 2013 to 2016, the upper extremity was used as access 72 times for 70 EVARs. Indication for upper extremity access was mostly for branch stent or coil placement (n=46; 64%) and establishing a brachiofemoral access (n=24; 33%). Other indications included branch cannulation for localization (n=11; 15%), and difficult contralateral gate cannulation (n=6; 8%) (table 1).

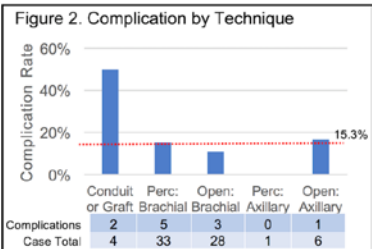
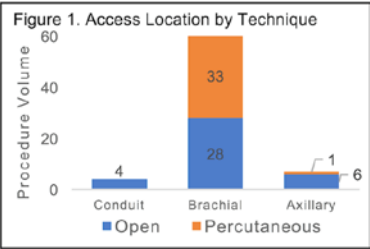
The brachial artery was used most frequently (n=61; 33 percutaneous, 28 direct cutdown), followed by the axillary artery (n=7; 1 percutaneous, 6 direct cutdown), with access into the pre-existing prosthetic graft or open conduit creation occurring least often (n=4; 1 prior axillofemoral bypass, 2 concurrent carotid-subclavian bypass, 1 concurrent carotid-axillary bypass) (figure 1). Overall complication rate was 15.3% (11/72) (figure 2). Strokes were observed in three patients (4.2%), all who had a concurrent or old carotid-subclavian bypass or transposition. Local complications included seroma (axillary cutdown, n=1), hematoma (brachial cutdown, n=2; brachial percutaneous, n=2), transient peripheral neuropathy (brachial cutdown, n=1; brachial percutaneous, n=1), and local dissection leading to pseudoaneurysm (brachial percutaneous, n=1). Only one local complication required secondary intervention (hematoma evacuation after brachial percutaneous access with a 5Fr sheath). All other patients with access complications were managed nonoperatively, with complete symptom resolution. There was no statistical difference in complications between the different access techniques, or sites (P=0.359).

SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** Local complications associated with upper extremity access during EVAR did not differ between access techniques. Strokes after upper extremity access occurred in patients with concomitant supra aortic trunk reconstructions.

Table 1. Indication for Upper Extremity Access by Index Case Type

Index Case Type	Total Cases	Branch Stent or Coil	Branch Localization	Brachio-Femoral Access	Contralateral Cannulation
Fenestrated/ Branched	9	9	0	5	0
Parallel (Chimney, Snorkel)	22	20	2	12	0
Thoracic EVAR	15	4	1	4	0
Infrarenal EVAR	26	13	8	3	6
Total	72	46	11	24	6



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #5

### **Locoregional Anesthesia Offers Improved Outcomes Following Endovascular Repair of Ruptured Abdominal Aortic Aneurysms**

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**Objectives:** General (GA) and locoregional anesthesia (LA) are two anesthetic options for endovascular repair of ruptured abdominal aortic aneurysms (REVAR). Studies on endovascular repair of elective, intact aneurysms have indicated that in select patients, LA may provide improved outcomes compared to GA. We evaluated the 30-day outcomes in patients undergoing REVAR under GA and LA in a contemporary nationwide cohort of patients presenting with ruptured AAAs.

**Methods:** Patients who underwent REVAR under GA and LA from 2011 - 2015 were studied in the American College of Surgeons' National Surgical Quality Improvement Program (ACS NSQIP) targeted EVAR database. Pre-operative demographics, operation-specific variables and post-operative outcomes were compared between the two groups.

**Results:** 690 patients were identified to have undergone REVAR, of which 12.5% (86) were performed under LA. Mean age was 74.3 years and 80% were male. Mean aneurysm size was 7.6 cm and did not differ between the two anesthetic groups. Major comorbidities and proximal or distal aneurysm extent also did not differ between the two groups except a slightly higher rate of CHF in the LA group (Table 1). There was a significantly higher rate of bilateral percutaneous access in the LA group (59.3% in the LA group; 25.2% in the RA group,  $P < .01$ ). REVAR under LA had shorter mean operative time (132 vs. 166 min,  $P < .01$ ) and lower rate of concomitant lower extremity revascularization (2.3% vs. 10.6%,  $P < .01$ ). There otherwise was no difference in need for other adjunctive procedures or peri-operative transfusion. Ultimately, 30-day mortality was significantly lower in the LA group (16.3% vs. 25.2%,  $P < .01$ ). This was even more dramatic in the subgroup of patients with hemodynamic instability (15.4% vs. 39.4%,  $P < .01$ ). After adjustment, there was a two-fold higher mortality in patients undergoing REVAR under GA versus LA, with a four-fold increase in the hemodynamically unstable cohort.

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** The ACS NSQIP targeted EVAR database shows that LA is used in only 12.5% of patients undergoing REVAR in this nationwide cohort. This rate does not change when examining the subset of patients who are hemodynamically unstable. These data suggest that LA should be considered in patients undergoing REVAR regardless of hemodynamic instability.

Table 1.			
Demographics, operative details and outcomes of General versus Locoregional anesthesia for endovascular repair of ruptured AAA	REVAR-GA (n=604)	REVAR-LA (n=86)	P-value
Age, years	74.3 (10.4)	74.6 (10.3)	0.79
Male	79.5% (480)	81.3% (70)	0.68
Body Mass Index	28.3 (6.8)	28.2 (5.5)	0.90
Smoking	33.6% (203)	29.1% (25)	0.40
COPD	19.9% (120)	14.0% (12)	0.19
CHF	2.5% (15)	7.0% (6)	0.02
Hypertension	67.7% (409)	72.1% (62)	0.41
End-stage renal disease	3.0% (18)	2.3% (2)	0.74
Proximal extent- infrarenal	81.3% (491)	86.0% (74)	0.31
Distal extent- aortic or common iliac	57.0% (344)	56.9% (49)	0.99
Access- bilateral percutaneous	25.2% (152)	59.3% (51)	< 0.01
Diameter <5cm	7.9% (48)	10.5% (9)	0.71
5-5.9cm	12.4% (75)	10.5% (9)	
6-6.9cm	11.8% (71)	8.1% (7)	
7-7.9cm	17.5% (106)	16.3% (14)	
8-8.9cm	11.6% (70)	10.5% (9)	
9-9.9cm	10.3% (62)	14.0% (12)	
>10cm	11.3% (68)	14.0% (12)	
Need for transfusion	67.2% (406)	61.6% (53)	0.30
30-day mortality	25.2% (152)	16.3% (86)	< 0.01
Hospital length of stay	9.1 (13.4)	6.8 (6.1)	0.12
ICU length of stay	5.0 (6.7)	3.0 (4.2)	0.01
Myocardial infarction	6.3% (38)	8.1% (7)	0.52
Pneumonia	10.9% (66)	3.5% (3)	0.03
Ischemic colitis	7.8% (47)	4.7% (4)	0.30
Unplanned readmission	8.8% (53)	10.5% (9)	0.01
Wound complication	2.3% (14)	1.2% (1)	0.49

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #6

### **Role of Intraplaque Lipid in Plaque Vulnerability**

Gayatri Raghuraman, PhD<sup>1</sup>, Mary Zuniga, BS<sup>1</sup>, LiXin Wang, MD<sup>1</sup>, Wei Zhou, MD<sup>2</sup>

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**Objective:** Plaque rupture is a major complication in atherosclerotic cardiovascular disease and diabetes mellitus exacerbates cardiovascular complications. Cell death, either of macrophage or vascular smooth muscle cells, is believed to be a primary feature contributing to the necrotic core formation and plaque vulnerability. The presence of intra-plaque lipid and its role in plaque vulnerability is still under-investigated. In this study, we examined the extent of lipid oxidation in plaques from diabetic vs non-diabetic patients and their effect on VSMC apoptosis.

### **Methods:**

Lipids were extracted from 17 carotid plaques of diabetic and non-diabetic subjects who underwent carotid endarterectomy. Oxidative stress within carotid plaques was measured using protein carbonylation assay. Extracted lipids were quantified using oleic acid standard and analyzed for lipid peroxidation. Human coronary artery smooth muscle cells (HCASMCs) were treated with lipid extracts for 18 hrs. Cells were analyzed for gene expression with RT-PCR and apoptosis using Annexin V and caspase-3 flow cytometric analyses. The conditioned media from the cells were assessed for inflammatory cytokines.

### **Results:**

Carotid plaques showed a large variation in oxidative stress in various plaque regions. Higher lipid peroxidation and protein oxidative modification in the central, more diseased region of carotid plaques, than less diseased peripheral regions. Lipid extracts from diabetic plaques have ~1.8 fold more oxidatively modified lipids compared to the non-diabetics. HCASMCs treated with lipids isolated from diabetic plaques show a significantly augmented rate of apoptosis by 3 fold. Cytokine analyses of the conditioned medium from these samples showed 4 fold higher levels of TNF- $\alpha$  in the diabetic samples. Gene expression data revealed increased resistin and CD40 expression in diabetics vs non-diabetics.

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** Collectively, these data suggest that lipids within atherosclerotic plaque are not inert. Increased oxidative stress in the vascular bed of diabetic patients results in amplified lipid/protein oxidation. These oxidized lipids in turn facilitate VSMC apoptosis triggering a possible secondary event leading to plaque vulnerability.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #7

### **Oral Supplementation with High Dose Fish Oil Alters Circulating Leukocyte Resolution Phenotype in Healthy Subjects and Patients with Peripheral Arterial Disease**

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**Objectives:** Peripheral arterial disease (PAD) is a chronic disease characterized by high levels of systemic inflammation. Recent work suggests that the resolution of inflammation is orchestrated by specialized pro-resolving lipid mediators (SPMs) largely derived from n-3 polyunsaturated fatty acids (PUFA), such as those found in fish oil. We hypothesize that PAD is associated with defective resolution and is modifiable by increasing SPM biosynthetic pathways via oral supplementation of n-3 PUFA.

**Methods:** In an oral dose finding study, 10 PAD subjects and 10 healthy subjects received escalating doses (1.25, 2.5, and 5 g/d) of an n-3 PUFA supplement for 5-day periods over 1 month. The red blood cell content of n-3 PUFA, the omega-3 index (O3I), was measured (n=10). Resolution phenotype was assessed by measurement of phagocytic activity of neutrophils (PMNs) and monocytes (Mo) as well as Mo cell surface markers. Phagocytosis of fluorescently labeled *E. coli* and expression of leukocyte surface markers were assessed by flow cytometric determination of median fluorescent intensity (MFI).

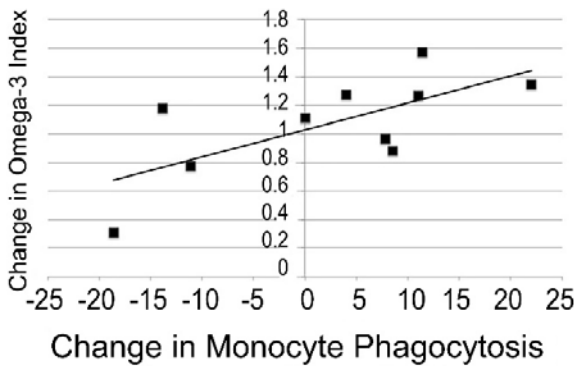
**Results:** Subjects had a significant increase in their O3I over the treatment period (+18.8±8.3% from baseline,  $P<0.0001$ ). Compared to baseline, monocyte phagocytosis increased (MFI 56.3±7.5 to 62.1±8.7,  $P=0.06$ ) after treatment and strongly correlated with the increase in O3I (Fig 1). PMNs also demonstrated a significant increase in phagocytosis over the study period (MFI 66.1±13.6 to 73.2±14.8,  $P=0.03$ ). There was a significant decrease in the Mo adhesion molecule CD18 (MFI 6620±1318 to 5489±1083,  $P=0.0001$ ), expressed on activated monocytes in inflammatory states. A decrease was also observed in the scavenger receptors CD163 (MFI 2946±624 to 2518±451,  $P=0.0002$ ) and CD36 (MFI 22760±5620 to 19996±3971,  $P=0.0001$ ), which are involved in chronic inflammation and the uptake of oxidized low-density lipoproteins, respectively.



SCIENTIFIC SESSION ABSTRACTS continued

**Conclusion:** Short-term, oral supplementation with escalating doses of n-3 PUFA increases the phagocytic activity of Mo and PMNs, and decreases the expression of Mo surface markers associated with systemic inflammation and atherosclerosis. Collectively these data demonstrate a basis for assessing the effects of oral SPM supplementation on leukocyte function and resolution phenotype in patients with PAD.

**Figure 1.** Correlation between the change in the omega-3 index and monocyte phagocytosis over the course of the treatment period. Pearson correlation  $r=0.69$ ,  $P=0.03$ .



Presentation #8

### **Long-Term Outcomes after Repair of Symptomatic Non-Ruptured Abdominal Aortic Aneurysms**

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Jason T. Lee, MD, E. John Harris, MD, Ronald L. Dalman, MD,  
Matthew W. Mell, MD, MS

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**Objective:** Long-term outcomes comparing symptomatic non-ruptured abdominal aortic aneurysms (sxAAA) to asymptomatic AAA (aAAA) have never been reported. We describe long-term outcomes of sxAAA and aAAA after repair at a single academic institution.

**Methods:** Patients receiving infrarenal AAA repair for sxAAA and aAAA from 1995 through 2015 were included. Ruptured AAA were excluded. Long-term mortality was the primary outcome, determined by chart review or link to Social Security Death Index. Additionally, long-term mortality and reinterventions were compared after propensity matching.

**Results:** AAA repair was performed for 1054 asymptomatic aneurysms (383 open repair, 671 [64%] EVAR), and 139 symptomatic aneurysms (60 open repair, 79 [57%] EVAR). Age (73 vs. 74,  $p=0.13$ ) and aneurysm diameter were similar between sxAAA and aAAA (6.0 cm vs. 5.8 cm,  $p=0.5$ ). The proportion of women was higher for sxAAA (26% vs. 16%,  $p=0.003$ ; TABLE). After propensity matching, there were no significant differences between groups for patient characteristics, AAA diameter, treatment modality, or comorbidities. Perioperative mortality was 5.0% for sxAAA and 2.3% for aAAA ( $p=0.55$ ). By life-table analysis, sxAAA had lower five-year (62% vs. 71%) and ten-year (39% vs. 51%) survival ( $p=0.01$ ; FIGURE) compared with aAAA for the entire cohort. Similar trends were observed for five-year and ten-year mortality after propensity matching (63% and 40% vs. 71% and 52%,  $p=0.08$ ). When stratified by repair type five-year and ten-year survival trended lower after open surgery (68% and 42% sxAAA vs. 84% and 59% aAAA;  $p=0.08$ ) but not EVAR (59% and 40% sxAAA vs. 61% and 49% aAAA;  $p=0.4$ ). Aneurysm-related reinterventions were similar for sxAAA and aAAA (15% vs. 14%,  $p=0.8$ ). Reinterventions were more common after EVAR compared with open repair (22% vs. 7%, sxAAA  $p=0.015$ ; 20% vs. 4% aAAA,  $p=0.007$ ). Stratified by repair type, reintervention was similar after EVAR (22% sxAAA vs. 20%

SCIENTIFIC SESSION ABSTRACTS continued

aAAA, p=0.8) and open repair (7% sxAAA vs. 5% aAAA, p=0.5).

**Conclusions:** Patients with symptomatic AAA had worse long-term survival and similar aneurysm-related re-interventions compared with patients with asymptomatic AAA undergoing repair, suggesting a different pathophysiology for sxAAA.

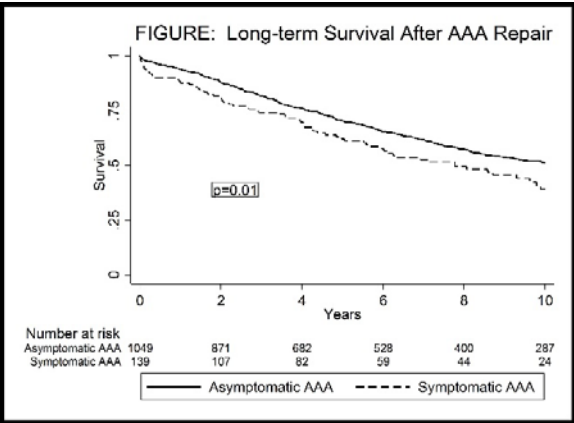


TABLE: Comparison of symptomatic and asymptomatic AAA Repairs						
Demographics	Entire Cohort			Propensity-Matched Cohort		
	Symptomatic	Asymptomatic	p-value	Symptomatic	Asymptomatic	p-value
	AAA (n=139)	AAA (n=1054)		AAA (n=136)	AAA (n=136)	
Age (years± s.d)	73 ± 10	74 ± 8	0.13	73 ± 10	72 ± 9	0.87
Female	26%	16%	0.003	26%	29%	0.59
Non-Caucasian	40%	29%	0.009	40%	38%	0.71
AAA Diameter (cm ± s.d.)	6.0 ± 1.6	5.8 ± 1.2	0.18	6.0 ± 1.6	5.9 ± 1.2	0.55
% EVAR Repair	57%	64%	0.12	57%	63%	0.32
Median year of repair	2004	2005	0.32	2005	2006	0.54

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #9

### **Endosalvage Techniques: Long-Term Results of Perigraft Arterial Sac Embolization (PASE) Suggest Safety, Efficacy, and Durability**

Andrew Barleben, MD, MPH<sup>1</sup>, Abid Mogannam, MD<sup>1</sup>, Meena Archie, MD<sup>3</sup>, John Lane, MD<sup>1</sup>, William Quinones-Baldrich, MD<sup>3</sup>

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**Objectives:** Clinically significant endoleaks remain costly, time-consuming, morbid and even mortal following endovascular aneurysm repair (EVAR). Perigraft arterial sac embolization (PASE) has been utilized to treat endoleaks (EL) diagnosed at the time of EVAR or after repair and subsequent sac growth.

**Methods:** Retrospective review of prospectively maintained databases were compiled from two institutions between 2008 and 2016. PASE was performed with a thrombin, contrast and gelfoam slurry prepared as previously described. The primary efficacy endpoint was cessation of aneurysm growth on CT scan. The primary safety endpoint was non-target embolization (NTO) and clinical sequelae. Secondary endpoints included persistent EL's and recurrent EL's.

**Results:** A total of 50 patients included in the study were treated with PASE (eg. Figures 1, 2). There were 22 Type 1 EL (33%) and 39 Type 2 EL (59%) treated. The average duration of follow-up was 26.4 months (1.0 - 142.0 months). In those treated and followed by CT scan, 100% of patients' aneurysms halted their growth following PASE, while 74% demonstrated sac regression (Avg 6 mm, 0 - 24 mm) when treated for Type 2 EL. Two patients required open repair for a subsequent diagnosis of a type 3b and a residual Type 1a EL's. No patients suffered non-target embolization, spinal ischemia, allergic reaction, rupture or obvious colonic ischemia. One patient had a one month delayed occurrence of colonic bleeding of unknown etiology following extensive workup. The number of Type 1 and Type 2 ELs decreased from 22 to 3 (86% success) and 39 to 11 (72 % success) respectively following PASE. When PASE was employed at the time of EVAR (26), 89% showed sac regression (Avg. 8 mm, 0 mm - 24 mm) and the remaining patients (3) showed stable sac size (Avg. 12.2 months, 1.0 - 40.1 months). There was no evidence of recanalization following thrombosis of culprit vessel for EL.

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** PASE proves to be an effective tool in sac management in conjunction with EVAR by stabilizing sac size and eliminating low and certain high-pressure ELs. It is safe and durable evidenced by patients who are stable out to 12 years. Further analysis is required to evaluate the morbidity and mortality benefit of this improvement in EVAR.

Figure 1. Aneurysm Sac Angiogram  
Identifying Outflow Prior to PASE,  
Example 1.

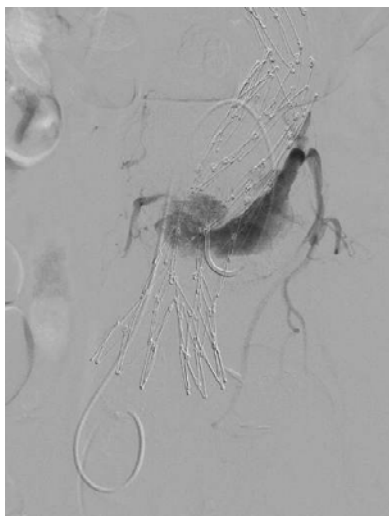
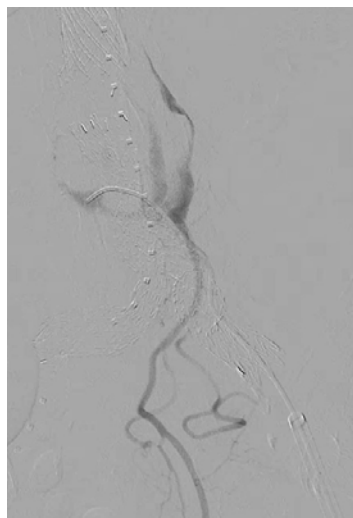


Figure 2. Aneurysm Sac Angiogram  
Identifying Outflow Prior to PASE,  
Example 2.



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #10

### **Open Thrombectomy of Arteriovenous Fistulas: Worth the Effort or Is It Time to Move On?**

Amir A. Ghaffarian, MD, Mark R. Sarfati, MD, FACS, Larry W. Kraiss, MD, FACS, Claire L. Griffin, MD, Brigitte K. Smith, MD, Graham Donald, MD, Benjamin S. Brooke, MD, PhD, FACS, Ragheed Al-Dulaimi MD

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**Objective:** Arteriovenous (AV) fistulas are the preferred hemodialysis access for patients with ESRD, although multiple percutaneous interventions are typically needed to maintain functional patency. When AV fistulas thrombose, however, there is debate whether open thrombectomy procedures should be attempted to salvage the access. This study was designed to evaluate outcomes following open thrombectomy of AV fistulas as compared to polytetrafluoroethylene (PTFE) AV grafts.

**Methods:** We identified all patients who underwent an open thrombectomy procedure for a thrombosed AV fistula or PTFE graft at a single academic medical center between January 2006 and March 2017. The specific type of AV fistula or graft was evaluated as well as patient demographics, comorbidities, medications, and interventions performed to maintain fistula patency. The primary outcome measures - successful dialysis after thrombectomy and time to recurrent thrombosis - were analyzed using Kaplan-Meier and Cox regression models.

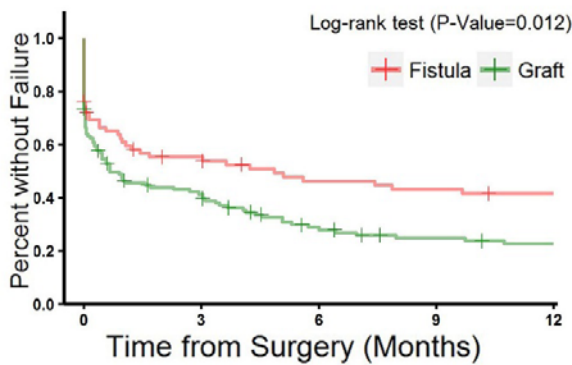
**Results:** A total of 221 thrombectomy procedures (160 patients with mean age 52 years, 60% female) were performed during the study period, of which 82 (37%) were undertaken in AV fistulas and 139 (63%) in AV grafts. Patients with AV fistulas [24% radiocephalic, 42% brachiocephalic, and 34% brachioabasilic], were less likely to be diabetic or have ischemic heart disease (both  $P < 0.05$ ) as patients with AV grafts, but just as likely to be on antiplatelet or statin agents. Following thrombectomy, there was no difference in use of adjuvant interventions to maintain patency (67% fistula vs. 73% graft;  $P = 0.4$ ), and an equal number of patients in both groups dialyzed successfully (62% fistula vs. 55% graft;  $P = 0.3$ ) at least once. However, rates of recurrent thrombosis at 1-year were significantly lower for AV fistulas vs. grafts ( $P < 0.05$ ; Figure), which was

SCIENTIFIC SESSION ABSTRACTS continued

confirmed in multivariate analysis where AV fistulas had a 37% lower risk of failure (HR: 0.63; 95%CI:0.43-0.93; P<0.05) after controlling for confounders.

**Conclusions:** Our data suggest that AV fistula thrombectomy is successful in nearly 2/3rd of cases with improved long-term outcomes compared to PTFE grafts. While the risk of access failure is high following thrombectomy, efforts to salvage AV fistulas are effective in most patients and should be undertaken when feasible.

Figure 1. Rates of Recurrent Thrombosis at 1-Year for AV Fistulas vs. Grafts



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #11

### **Influence of Arterial and Venous Size on Fistula Maturation and Use**

Jonathan Misskey, MD, Ramin Hamidizadeh, BSc, Jerry Chen, MD, MSc,  
Jason Faulds, MD, MSc, Joel Gagnon, MD, York Hsiang, MD, MHSc

University of British Columbia, Vancouver, BC

**Objective:** The autogenous arteriovenous fistula (AVF) is the standard procedure for patients requiring chronic hemodialysis. To enhance success, preoperative duplex mapping has been advocated, and authors have suggested using minimum outflow vein diameter (MOVD) and perianastomotic arterial diameter to guide placement, though specific values remain to be clearly defined. The goal of this study was to determine anatomical and clinical variables that may influence access patency to guide optimal autogenous access configuration selection.

**Methods:** AVF created from 2010-2016 were analyzed from data entered into a prospective database. Pre-procedure duplex mapping data of venous and arterial diameters, and demographic and clinical variables were collected. Kaplan Meier and Cox Hazards analysis were used to assess patencies, maturation, and identify independent predictors of access failure.

**Results:** Five hundred thirty-five AVF were created (median follow-up 17.0 months; range 0 - 73). Of these, 265 (49.5%) were radiocephalic, 221 (41.3%) were brachiocephalic, and 49 (9.2%) were brachio basilic. AVF with a MOVD <3mm were associated with inferior primary patencies at 12 (43±4% vs. 54±4%; P = 0.009) and 36 months (19±4% vs 33±4%), and secondary patencies at 12 (75±3% vs. 91±2%, p<0.001) and 36 months (63±4 vs. 78±4%; P<0.001). Arterial diameter <2mm for radiocephalic AVF was associated with impaired maturation at 12 months in diabetics vs. nondiabetics (53±9% vs. 87±8%), with no differences observed in maturation rates with radial artery diameters > 2mm (84±5% vs. 85±4%) (P = 0.019). On multivariate regression, MOVD (HR 0.02; 95% CI 0.01-0.23, P = 0.002) female sex (HR 1.75 95%CI 1.12-2.73) and diabetes (HR 1.67; 95% CI 1.00 - 2.79; P = 0.048) were associated with secondary patency loss.

**Conclusions:** MOVD is strongly predictive of autogenous access patency. Radial artery diameter <2mm was predictive of radiocephalic AVF failure to mature, but only in diabetic patients.



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #12

### **Survival Trends After IVC and Aortic Injuries in the US**

Bernardino C. Branco, MD, FACS, Tashinga Musonza, MD,  
Michael Long, MD, Jay Chung, MD, FACS, Samuel R. Todd, MD, FACS,  
Matthew J. Wall, Jr, MD, FACS, Joseph L. Mills Sr., MD, FACS,  
Ramyar Gilani, MD, FACS

Baylor College of Medicine, Houston, TX

**Objectives:** The purpose of this study was to explore patterns in epidemiology and mortality after IVC and aortic injuries in the US.

**Methods:** A 13-year analysis of the NTDB (2002-2014) was performed to extract all patients who sustained inferior vena cava, thoracic or abdominal aortic injuries. Demographics, clinical data and outcomes were extracted. Patients were analyzed according to injury mechanism.

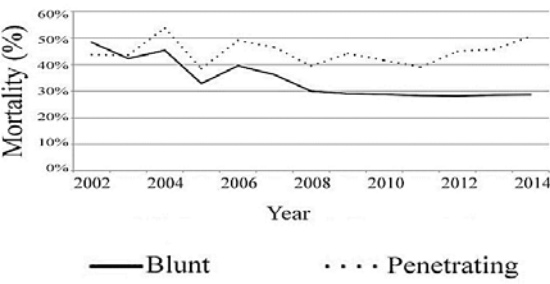
**Results:** A total of 25,428 patients were included in this analysis. Overall, the mean age was  $39.8 \pm 19.1$  years, 70.3% were male, 14.1% sustained penetrating trauma. Whereas the incidence of all 3 injuries remained constant throughout the study period, for blunt trauma, mortality decreased over the study period (48.8% in 2002 to 28.7% in 2014,  $p < 0.001$ ) [Figure], in particular for thoracic (46.6% in 2002 to 23.8% in 2014,  $p < 0.001$ ) and abdominal (59.2% in 2002 to 30.1% in 2014,  $p < 0.001$ ) aortic injuries. The mortality blunt IVC injuries remained stable throughout the study period (51.0% in 2002 to 49.7% in 2014,  $p = 0.783$ ). This decrease in mortality after blunt trauma was accompanied with an increase in endovascular procedures over the study period (0.8% in 2002 to 17.1% in 2014,  $p < 0.001$ ), in particular for blunt thoracic aortic injuries (from 2.1% in 2002 to 39.6% in 2014,  $p < 0.001$ ). When penetrating trauma patients were analyzed, overall there was an increase in mortality (43.8% in 2002 to 50.6% in 2014,  $p < 0.001$ ) [Figure], in particular after abdominal aortic injury (38.7% in 2002 to 71.4% in 2014,  $p < 0.001$ ). Similar trends were observed for IVC and thoracic aortic injuries. No clinically significant increase in endovascular utilization in penetrating trauma was identified (0.8% in 2002 to 1.6% in 2014,  $p = 0.357$ ).

**Conclusions:** The present study demonstrates an overall decrease in mortality after blunt IVC and aortic injuries in the US. This decrease was accompanied with an increase in utilization of endovascular procedures. After penetrating

SCIENTIFIC SESSION ABSTRACTS continued

trauma however, despite contemporary advances in trauma care, mortality has increased over the study period in particular after abdominal aortic injury. No significant increase in endovascular utilization in penetrating trauma was found.

**Figure 1.** Mortality throughout the study period according to injury mechanism



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #13

### **Getting to Choosing Wisely: The Value of a PE Clinical Decision Tool to Enhance Appropriateness of Care**

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University of Texas Health San Antonio, San Antonio, TX

**Objective:** Pulmonary embolism is the third most common cause of cardiovascular death, affecting between 300,000 to 600,000 patients annually. Presentation is non-specific, resulting in the reflexive decision to evaluate with computed tomography pulmonary angiography, which has a low diagnostic yield (10-20%). However, clinical tools such as Wells' Criteria and D-dimer levels are validated non-radiographic methods to rule out PE and effectively reduce diagnostic time, cost, and potential complications. The aim of this study was to determine diagnostic yield and implement a clinical decision making tool to reduce overutilization.

**Methods:** A retrospective chart review of all patients (699) who underwent CT pulmonary angiography from January to June 2016 was completed. An electronic medical document utilizing Wells criteria was then created with embedded order links for D-Dimer and CT pulmonary angiography based on score. Physician education and introduction of the document was focused on the internal medicine services. Post-intervention data was then collected from November to January 2016 with a total of 458 CT scans completed.

**Results:** Of the 699 pre-intervention studies reviewed, a positive CT PE result was present in 7.3% (51 patients), 91.5% (639 patients) were negative, and 1.3% (9 patients) ruled non-diagnostic due to contrast timing or motion artifact. Of the 35.8% (250 patients) who were assigned a low modified Wells Score ( $\leq 4$ ), only 2% (5) had a positive CT PE vs. 96.8% (242) with a negative result. For patients with a high modified Wells Score, 10.2% (46 patients) had a positive CT PE vs. 88.4% (397) with a negative result. Of the 458 post-intervention studies reviewed, a positive CT PE result was present in 7.4% (34 patients). However, the diagnostic yield for the interval medicine service was 10.9% versus 3.5% (pre-intervention).

SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** Overutilization of CT Pulmonary Angiography is a pervasive problem with national diagnostic rates of only 10-20%. Our results demonstrate a diagnostic rate below the national average, but confirm the well-established validity of Wells Criteria as a clinical decision making tool (Figure 1). Furthermore, as evidence by the improved diagnostic rate of the internal medicine service, education and systematic tools (Figure 2) can effectively aid physician decision making.

Figure 1. CT Pulmonary Angiography Diagnostic Rate for Internal Medicine Service

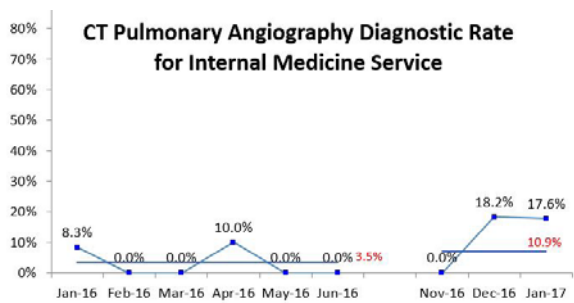
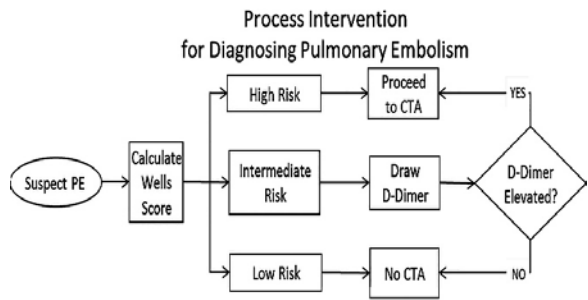


Figure 2. Process Intervention for Diagnosing Pulmonary Embolism



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #14

### **Outcomes of Thoracic Endovascular Aortic Repair (TEVAR) in Patients with Type B Aortic Dissection (TBAD) Enrolled in the Global Registry for Endovascular Aortic Treatment (GREAT)**

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<sup>1</sup>University of Texas Health Science Center at Houston, Houston, TX, <sup>2</sup>Baylor University Medical Center, Dallas, TX, <sup>3</sup>IRCCS Policlinico San Donato, Cardiovascular Center, San Donato Milanese, Italy, <sup>4</sup>University of Southern California, Los Angeles, CA

**Objective:** The Global Registry for Endovascular Aortic Treatment (GREAT) is a prospective multicenter registry collecting real-world data on the performance of WL Gore (Flagstaff, AZ) aortic endografts. The purpose of this study was to analyze the implementation and outcomes of Thoracic Endovascular Aortic Repair (TEVAR) in GREAT patients with type B aortic dissection (TBAD).

**Methods:** From 2010-2016, over 5000 patients were enrolled in GREAT from 113 centers in 14 countries across 4 continents. Those treated for TBAD comprised the study population. The primary outcomes of interest were mortality and reintervention-free survival (a composite endpoint which reflected mortality, aortic enlargement/rupture, reintervention, and/or conversion to open surgery).

**Results:** 271 patients (215 male (79.3%), mean age 60.8±11.9 years) underwent TEVAR for the treatment of TBAD. Treated dissections were categorized as acute complicated (AC) (39%), acute uncomplicated (AU) (26%), chronic complicated (CC) (21%), and chronic uncomplicated (CU) (14%). Procedural survival was 100%. Over a mean follow-up of 360 days, the incidence of neurologic events was 1.8%, and mortality was 9.2%. There was no difference in aortic-related mortality or reintervention-free survival when comparing TEVAR for any subset of patients ( $p=0.55$ ) (Figure 1). However, at four years, survival was significantly decreased in patients treated with TEVAR for chronic TBAD (Figure 2).

**Conclusions:** TEVAR for TBAD is currently being performed with a low rate of neurologic events. Procedural death has not been reported and aortic-related mortality is low across all subsets of patients. Patients treated with TEVAR for chronic TBAD had a significantly decreased survival beyond four years. Further analysis is required to determine the patient factors and technical details that account for these findings.

Figure 1. Reintervention-Free Survival by Dissection Type

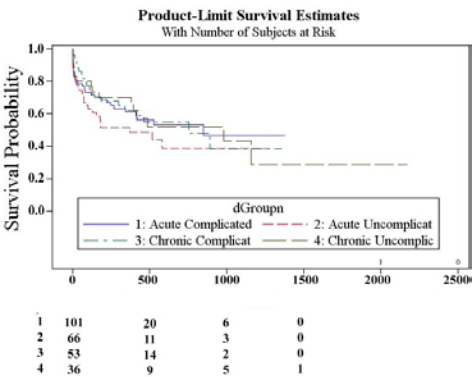
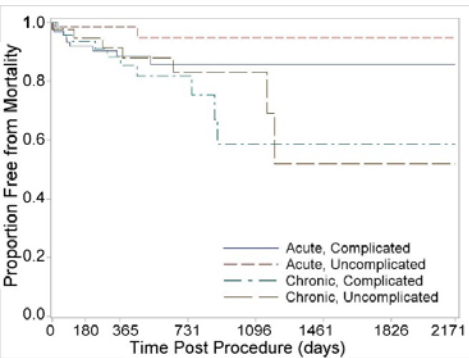


Figure 2. Long-term Freedom from All-Cause Mortality by Dissection Type



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #15

### **The Role of Ascending Aortic Size in Outcomes of Patients with Uncomplicated Acute Type B Aortic Dissection**

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Kristofer M. Charlton-Ouw, MD, Anthony L. Estrera, MD,  
Charles C. Miller, PhD, Hazim J. Safi, MD, Ali Azizzadeh, MD

The University of Texas Medical School at Houston, Houston, TX

**Objective:** Recent studies have shown that patients with uncomplicated acute type B aortic dissection (uATBAD) with enlarged aortic diameters are at high risk of developing complications. This study aims to determine the effect of maximum ascending aortic diameter and area on outcomes of uATBAD.

**Methods:** All patients admitted with uATBAD from 6/2000 to 1/2015 were reviewed, and those with available imaging were included. Maximum ascending aortic diameter and area measurements were obtained by a specialized cardiovascular radiologist. Outcomes including need for intervention and mortality were tracked over time. Data were analyzed by stratified Kaplan-Meier and multiple Cox regression analysis using SAS 9.4.

**Results:** During the study period, 304 patients with uATBAD were admitted, with 245 having non-contrast CT and 131 having CTA imaging and adequate follow up available for analysis. The cohort had an average age of 60.9 years (60% male, 53% Caucasian). Ascending aortic area  $>12.1\text{cm}^2$  was highly associated with subsequent arch/proximal progression ( $p<0.01$ ), and predicted lower intervention-free survival ( $p<0.01$ ). Ascending diameter  $>40.8\text{mm}$  predicted lower intervention-free survival ( $p=0.01$ ). Maximum aortic diameter along the length of the aorta  $>44\text{mm}$  persisted as a risk factor for mortality (HR 7.34;  $p<0.01$ ) after adjustment for DM (6.4;  $<0.01$ ), age (1.06/yr;  $<0.01$ ), history of stroke (5.03;  $<0.01$ ), syncope on admission (21.11;  $<0.01$ ), and ascending diameter  $>40.8\text{mm}$  (1.09; 0.85). Max ascending aortic diameter failed to predict overall survival when two groups were compared  $>40.8$  and  $<40.8$  ( $p=0.12$ ). However maximum aortic diameter along the length of the aorta  $>44\text{mm}$  held true as previously demonstrated ( $p<0.01$ ). Maximum aortic diameter along the length of the aorta  $>44\text{mm}$  persisted as a risk factor for decreased intervention-free survival (HR, 3.142;  $p<0.01$ ), syncope on admission (26.3;  $p<0.01$ ), pleural effusion on admission (3.02;  $p<0.01$ ), and ascending diameter  $>40.8\text{mm}$  (2.01;  $p=0.04$ ).

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** uATBAD patients with ascending aortic area  $>12.1 \text{ cm}^2$  are at high risk of developing subsequent arch/proximal progression and may require closer follow up or earlier intervention. Ascending aortic size (diameter and area) is predictive of decreased intervention free survival in patients with uATBAD.



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #16

### **Utilization of Spinal Cord Protection Adjuncts in Thoracic Endovascular Aortic Repair**

Jason Faulds, MD, Gary Yang, MD, Kyle Arsenault, MD, Jon Misskey, MD, Jerry Chen, MD, Charles Dong, MD, Michael Janusz, MD

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**Objectives:** Adjuncts for early detection and treatment of spinal ischemia in thoracic aortic surgery are supported by robust clinical experience in open repair. The utility of cerebrospinal fluid drainage and neurophysiologic monitoring in endovascular thoracic aortic surgery is less clear. In our institution, neurophysiologic monitoring and CSF drainage are used in all complex TEVAR cases and in selected standard TEVAR procedures. The low rate of spinal cord injury in standard TEVAR, combined with potential risks associated with CSF drainage have lead us to review our experience with liberal utilization of CSF drains and neurophysiologic monitoring.

**Methods:** Retrospective analysis of all patients undergoing endovascular thoracic aortic repair from a single institution. Complex thoracic interventions were excluded. Preoperative characteristics, aneurysm extent and etiology, were reviewed. Neurophysiologic monitoring data was reviewed to determine influence on intraoperative management.

**Results:** A total of 223 patients had TEVAR and 130 met the inclusion criteria. Cerebrospinal drainage was used in 71 patients (54.6%). On average, drains were removed 1.6 days post- op, with over two thirds being removed on the first post-operative day. Median total drain output was 168 mL. Complications related to CSF drainage occurred in 4 patients (5.6%) with major complications occurring in 2 patients (2.8%) Neurophysiologic monitoring was used in 56 (43.1%) patients. Changes in MEP were noted in 28(50%) of these patients, and represented mild unilateral leg ischemia in all but two cases. In these two patients, changes consistent with spinal cord injury were noted and both resolved with augmentation of blood pressure. Neither patient went on to develop post-operative spinal cord injury.

**Conclusions:** Spinal cord injury after standard TEVAR is rare, and is most commonly delayed in presentation. Intra-operative monitoring identified two patients with a suspected spinal cord event that lead to changes in

## SCIENTIFIC SESSION ABSTRACTS continued

clinical management. None of the patients with clinically evident SCI had neurophysiologic monitoring changes and all could have had CSF drainage catheters placed at the time of their event.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #17

### **Preoperative Frailty Assessment Predicts Loss of Independence Following Vascular Surgery**

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University of Utah, Salt Lake City, UT

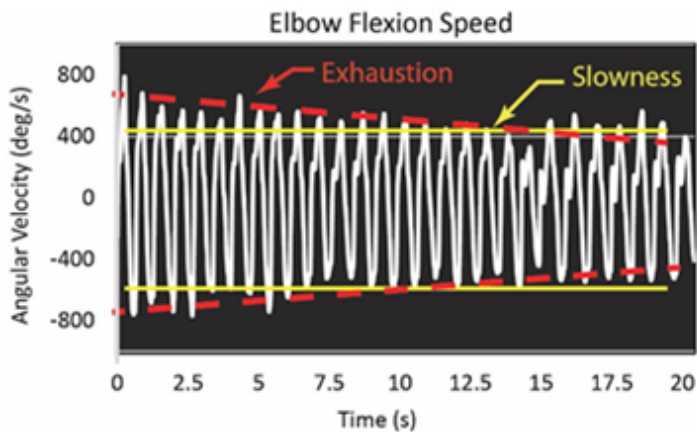
**Objective:** Frailty is a clinical syndrome associated with loss of metabolic reserves that is prevalent among patients who present to vascular surgery clinics for evaluation. The clinical frailty scale (CFS) is a rapid assessment method shown to be highly specific for identifying frail patients. In this study, we sought to evaluate whether the preoperative CFS score could be used to predict loss of independence following major vascular procedures.

**Methods:** We identified all patients living independently at home that were prospectively assessed using the CFS before undergoing an elective major vascular surgery procedure (admitted for more than 24 hours) at an academic medical center between January 2016 and January 2017. Patient and procedure-level data was obtained from our institutional Vascular Quality Initiative (VQI) registry database. The composite outcome of discharge to a skilled nursing facility or 30-day mortality was evaluated using bivariate and multivariate regression models.

**Results:** A total of 75 independent patients were assessed using the CFS prior to undergoing elective open AAA repair (9%), EVAR (17%), TEVAR (4%), supra-inguinal bypass (8%), infra-inguinal bypass (19%), CEA (13%), or peripheral vascular intervention (29%). Among 21 (28%) individuals categorized as being frail using the CFS, there was no significant difference in age, gender, or length of hospital stay (6-days frail vs. 4-days non-frail;  $P=0.15$ ) when compared to non-frail patients. However, frail patients were significantly more likely to need mobility assistance following surgery (67% frail vs. 25% non-frail;  $P<0.01$ ) and be discharged to a nursing facility or die within 30-days after surgery (33% frail vs. 9% non-frail;  $P=0.01$ ). Pre-operative frailty was associated with an over 4-fold higher risk (OR:4.8; 95%CI:1.1-20.7;  $P<0.05$ ) of 30-day mortality or loss of independence, independent of the vascular procedure undertaken.

SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** The CFS is a practical tool for assessing preoperative frailty among patients undergoing elective major vascular surgery, and can be used to predict likelihood of requiring discharge to a nursing facility following surgery. The identification of frail patients before major surgery can help to manage post-operative expectations and optimize transitions of care.



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #18

### **Using Frailty and Cognitive Assessment to Predict Adverse Events after Major Vascular Intervention - Application of Wearable Technologies**

Miguel Montero, MD, Bijan Najafi, PhD, MSc, Vanessa Hinko, BSc, Simon Hoeglner, BSc, Hadi Rahemi, PhD, Ana Enriquez, BS, Jayer Chung, MD, Neal Barshes, MD, Ramyar Gilani, MD, Joseph Mills, MD

Baylor College of Medicine, Houston, TX

**Objectives:** According to NSQIP guidelines, frailty and cognitive performance (CP) should be evaluated as a part of the pre-op decision making process for geriatric patients. However, a quick, accurate, and simple tool to assess frailty and cognitive capacity is not available. This issue is challenging among patients with peripheral artery disease (PAD) who are unable to perform gait tests.

**Methods:** We used a novel wearable sensors system for frailty assessment (Frailty meter: “FM”, Figure 1). FM quantifies weakness, slowness, range of motion, and exhaustion in a 20-second elbow flexion and extension task. To investigate predictability of adverse events using FM, 20 lower extremity PAD patients (age:  $65 \pm 8$  years; 60% male; Rutherford score:  $4.4 \pm 1.3$ , 58% outpatient) were assessed prior to endovascular revascularization. To examine CP, we added a working memory task to the FM (dual task FM: “DTFM”, performing FM task while counting backwards from a random number). All subjects were followed for 1 month post-op.

**Results:** All subjects completed FM and DTFM tests, while 40% were unable to perform gait test. FM results show that 50% of patients were frail. At 30 days, 45% of subjects had either major post-op adverse cardiovascular or limb events (AE), including death (20%), stroke (5%), re-intervention (25%), and major amputation (10%) post-op. Baseline clinical and demographic information were not different between AE and non-AE groups (except WIFI score  $p=.032$ ). However, FM score was  $0.25 \pm 0.11$  in the non-AE group and significantly increased to  $0.46 \pm 0.19$  in AE group (Cohen’s  $d=1.26$ ). Besides, AE group had a significantly lower score on CP measured by DTFM ( $p=.010$ ). Also, frail people had 38% ( $p=.077$ ) longer length of hospital stay and 41% lower skin perfusion pressure (SPP;  $p=.096$ ), but had identical Rutherford score than non-frail patients ( $p=.921$ ).

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** This pilot study demonstrates the feasibility and practicality of using FM to predict AE in PAD patients undergoing endovascular intervention. Gait test was impractical in 40% of patients. Thus using an alternative motor-cognitive test to identify frailty and CP is of high value. Confirmation of results in a larger sample size may assist in providing better patient centered communication and pre-op decision making consistent with patient values and preferences.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #19

### **Multidisciplinary Limb Salvage Service: Reducing Major Amputations in Diabetic Foot Infections**

Eric Pillado, BS, Kimberly Lauer, FNP-C, Eli Ipp, MD,  
Richard A. Murphy, MD, MPH, Ashley Miller, DPM, Frederic Bongard, MD, JD  
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**Objective:** Diabetic foot infections (DFI) can lead to limb loss and mortality. To improve patient care at a safety net teaching hospital, we created a multidisciplinary vascular limb salvage service (LSS). This study describes outcomes before and after creation of this service.

**Methods:** Adults admitted to the newly established LSS for DFI during a six-month period from 2016-2017 were included prospectively. Patients admitted to LSS had routine endocrine and infectious disease (ID) consults - guided by routine culture and sensitivity testing - per a standardized protocol. Concomitantly, a retrospective analysis of patients admitted to the acute care surgical service for DFI prior to creation of the LSS during an eight-month period from 2014-2015 was performed. We excluded patients who underwent emergent procedures for necrotizing soft tissue infections.

**Results:** A total of 250 patients were divided into two groups: Group 1 (pre-LSS, n=92) and Group 2 (LSS, n=158). There were no significant differences in baseline characteristics (Table 1). However, more patients in LSS had hypertension (56% vs 39%,  $p=0.01$ ) and prior wound infection (35% vs 14%,  $p<0.001$ ). Significantly, after the institution of LSS, fewer patients underwent a major amputation, defined as a below the knee (BKA) or transmetatarsal (TMA) amputation (Table 2). There was no difference in the length of hospital stay or 30-day readmission rate between the groups.

**Conclusions:** The initiation of a multidisciplinary limb salvage service decreased the major amputation rate in patients with diabetic foot infections, specifically below the knee amputation. We attribute this in part to culture-directed antimicrobials resulting from standardized protocol and ID consultation. Similarly, inpatient diabetes management was optimized by the endocrine service. Length of stay was not increased nor was 30-day readmission rate affected. These results suggest that a robust multidisciplinary vascular limb salvage service dedicated to the management of diabetic foot infections is both feasible and effective even in safety net hospitals.

# SCIENTIFIC SESSION ABSTRACTS continued

Table 1. Patient characteristics at the time of hospital admission			
	Group 1 (n=92) Pre LSS (%)	Group 2 (n=158) LSS (%)	p-value
Male	75 (81.5%)	132 (83.5)	0.68
Age, yrs	54.8±11.2	52.5±9.7	0.08
BMI	30.5±10.1	30.1±8.0	0.75
Insulin Use	45 (48.9)	84 (53.2)	0.52
Prior Amputation	45 (48.9)	58 (36.7)	0.06
Prior Debridements	11 (12.0)	33 (20.9)	0.07
HbA1C, %	10.1±2.7	9.2±2.2	0.06

Table 2. Hospital course and outcomes pre LSS and during LSS			
	Group 1 (n=92) Pre LSS	Group 2 (n=158) LSS	p-value
Toe amputation	37 (40.2)	62 (39.2)	0.88
TMA	11 (12.0)	4 (2.5)	0.001
BKA	12 (13.0)	4 (2.5)	0.01
Major Amputation	20 (21.7)	15 (9.6)	0.01
Use of antimicrobials	39 (42.4)	128 (81.0)	<0.001
Length of hospital stay, days	9.7±21.2	7.1±6.1	0.16
30-day Readmission	19 (20.7)	29 (18.4)	0.66



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #20

### **Evaluation of Near-Instant Non-invasive Optical Imaging of Tissue Perfusion for Vascular Assessment**

Craig Weinkauff, MD, PhD<sup>1</sup>, Kairavi Vaishnav, BS<sup>1</sup>, Brain Hoang, MD<sup>1</sup>, Amaan Mazhar, PhD<sup>2</sup>, David J. Cuccia, PhD<sup>2</sup>, David G. Armstrong, MD, PhD<sup>1</sup>

<sup>1</sup>University of Arizona, Tucson, AZ, <sup>2</sup>Modulated Imaging Inc., Irvine, CA

**Objective:** Non-invasive vascular tests are critical for identifying patients who would benefit from surgical revascularization, yet are highly limited in diabetics. This case study evaluates the potential of Spatial Frequency Domain Imaging (SFDI) as a non-invasive vascular testing modality for lower limb assessment.

**Methods:** We evaluated Ankle Brachial Index (ABI), pedal doppler waveforms, toe pressure and SFDI in 50 patients with peripheral artery disease (PAD) with and without diabetes (Figure1). SFDI is a non-contact photographic imaging technology that uses structured illumination to quantify tissue (2-3 mm) oxygen saturation and hemoglobin over large fields of view (15cm x 20cm) within ten seconds.

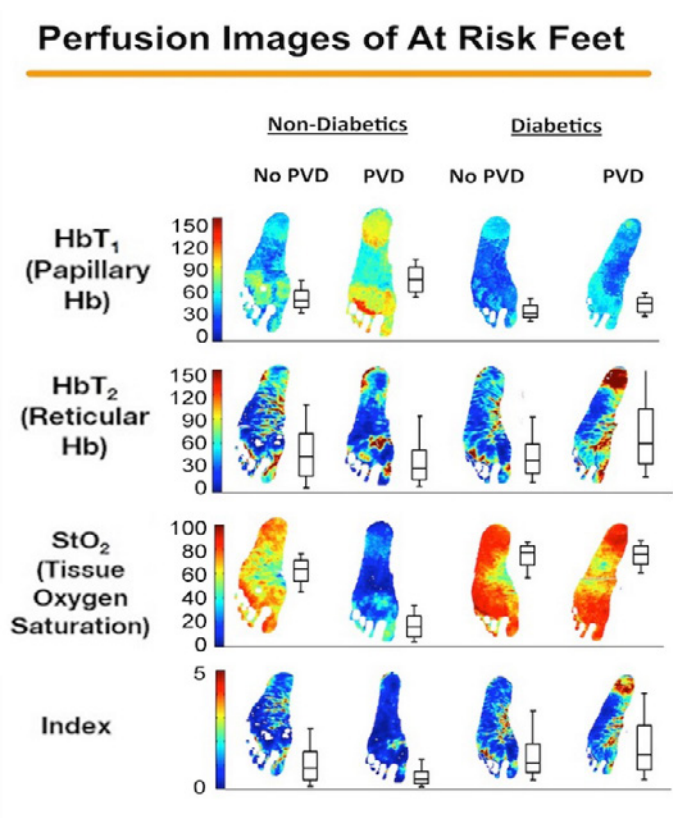
**Results:** This first of use study in PAD demonstrates the ability of SFDI to capture reliable clinical measurements of perfusion in plantar aspects of feet. Non-diabetic patients with ABI<0.9 had a significantly lower StO<sub>2</sub> than those with an ABI > 0.9 (p<0.04). In contrast, StO<sub>2</sub> in diabetic patients does not correlate with ABI, raising the possibility that SFDI could be a more accurate measure of blood supply in diabetics. In addition, spatial variation in SFDI measurement correlated with angiosome perfusion differences seen in specific patients. Beyond perfusion analysis, SFDI revealed significantly elevated tissue oxygen saturation and decreased superficial blood volume in people with diabetes compared to those without (p<.002). This is likely secondary to arterio-venous shunting associated with vasomotor dysfunction. We hypothesize that such a measurement will be a good marker for severity of the peripheral effects of diabetes in any individual patient.

**Conclusions:** SFDI is a feasible, rapid and easy-to-use wide-field measurement of perfusion in a clinical setting. This initial study suggests the technology has substantial potential to evaluate lower extremity perfusion in diabetics and non-diabetics, evaluate angiosome specific perfusion and may represent a novel new

SCIENTIFIC SESSION ABSTRACTS continued

tool for near-instant quantitative analysis of diabetes severity. Further studies with increased patient numbers will need to be designed.

Figure 1. Perfusion Images of At-Risk Feet



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #21

### **Optimal Medical Management Prior to Lower Extremity Bypass: Are We Achieving this Goal and Improving Outcomes?**

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Angela P. Presson, PhD, Chong Zhang, MS, Larry W. Kraiss, MD, FACS,  
Benjamin S. Brooke, MD, PhD, FACS

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**Objective:** Optimizing medical management through glucose control, smoking cessation and drug therapy (i.e. anti-platelet & statin agents) is recommended as first-line therapy for patients with claudication. The aims of this study were to determine how frequently Veterans with claudication received optimal medical management (OMM) prior to undergoing elective open lower extremity bypass procedures at Veterans Administrative Medical Centers (VAMC) and whether preoperative OMM was associated with improved surgical outcomes.

**Methods:** We reviewed all patients within the VA Surgical Quality Improvement Program (VASQIP) database who underwent elective open lower extremity bypass procedures for claudication at nationwide VAMC from 2000 until 2014. We defined OMM as a claudicant receiving all of the following within 12 months prior to bypass: prescriptions for antiplatelet, statin, and smoking cessation (if a smoker) therapy and hemoglobin A1c monitoring (if a diabetic). Outcome measures included occurrence of any VASQIP complication, 5-year amputation free survival, along with 30-day and 1-year mortality. We used multivariate regression models to analyze the effects of OMM on outcomes after adjusting for patient-level confounding.

**Results:** Among 10,271 lower extremity bypass procedures performed across 23 different VA regions, 2,265 (22%) were undertaken in claudicants with median (IQR) age of 63 years (58-68). Of claudicants, 839 (37%) were diabetic and 1333 (59%) smoked within 12 months prior to surgery. OMM was achieved in only 581 (26%) claudicants prior to undergoing surgery, although adherence to individual components was variable: anti-platelet (55%), statin (63%), and smoking cessation (58%) therapies, and hemoglobin A1c monitoring (92%). In risk-adjusted analyses, there were no statistically significant differences in any outcome among patients who received OMM compared to non-OMM patients (Table).

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** Only a quarter of Veterans with claudication received OMM prior to undergoing open lower extremity bypass across nationwide VAMC, highlighting the need for strategies to ensure medical therapy is intensified prior to surgical revascularization. Nevertheless, our data show that preoperative OMM in claudicants did not improve short or long-term postoperative outcomes.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #22

### **Trends in Washington State Aortic-Related Deaths over a 21-year period, 1996 - 2016**

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Sherene Shalhub, MD, MPH

University of Washington, Seattle, WA

**Objectives:** The trends of deaths attributable to aortic pathology have been poorly characterized within the United States, especially at the state level. We aimed to evaluate aortic-related mortality trends in Washington State. We hypothesized that aortic-related death rates have decline over the last two decades given the considerable advances in aortic pathology management.

**Methods:** Death certificates from 1996 to 2016 were obtained from the Washington state Department of Health. Cases in which an aortic aneurysm and/or dissection were listed as a cause or a contributing cause of death were analyzed. Cause of death was classified by category based on the ninth and tenth revisions of the International Classification of Diseases. Age-standardized rates for death were calculated by year. Death rates were compared as stratified by sex, race, and county. Data are presented as mean (averaged over all years) and standard deviation.

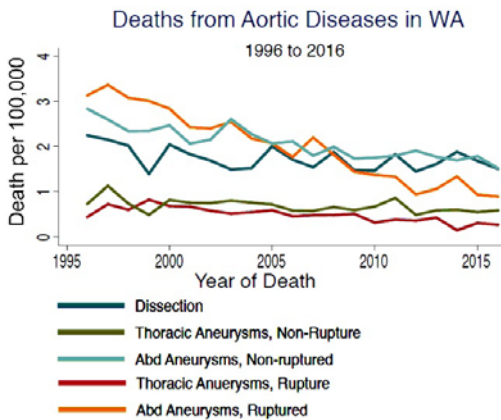
**Results:** Of 1,014,039 deaths over 21 years, 9,255 were aortic-related (60% Male, 92% White, mean age 76.2+12.8 years). Half of these deaths were due to abdominal aortic aneurysms (50.2%). The mean death rate was 8.1+1.8 per 100,000 and demonstrated a steady decline over time with the most pronounced decline in deaths due to abdominal aortic ruptures (Figure 1). Comparison of death rates by sex demonstrated higher death rates in males than females (8.6/100,000 [6.5 -11.9] vs. 5.5/100,000 [3.6 -7.1] respectively,  $p < 0.001$ ). Males died at a younger age compared to females (Table 1). By race, Native Hawaiians and Pacific Islanders died at a higher rate of aortic disease compared to whites (15+7.2/100,000 vs. 7.7+1.3/100,000 respectively,  $p < 0.001$ ). Analysis by county demonstrated higher death rates in counties furthest from population centers (Figure 2).

**Conclusions:** Mortality from aortic disease in Washington State has declined over the last 21 years, predominantly due to a reduction in ruptured abdominal aortic aneurysms related-deaths. Males died at a higher rate and at a younger

SCIENTIFIC SESSION ABSTRACTS continued

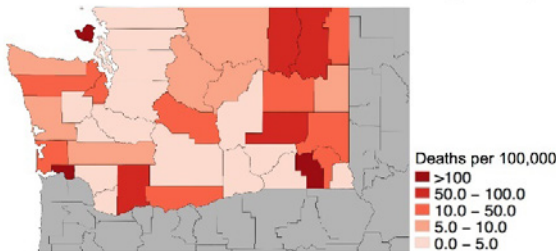
age than females. There is a clear variation in death rates by county. Further investigation is needed to understand geographic trends with the goal of decreasing variance across the state.

**Figure 1:** Age-standardized death rates in Washington State (1996 -2016) by category demonstrating that the steady decline observed in aortic-related death rates is related to a significant decline in deaths from ruptured abdominal aortic aneurysms.



**Figure 2:** Age-standardized death rates in Washington State (1996 -2016) by county demonstrating clear variation between counties with San Juan, Columbia, and Wahkiakum counties having the highest aortic-related death rates.

Death Rates from Aortic Disease in WA in 2016 by County



SCIENTIFIC SESSION ABSTRACTS continued

Table 1: All-cause and aortic-related mortality in Washington State (1996-2016)

Mean (+ SD)	N	Age-standard- ized death rate per 100,000	Crude Death Rate per 100,000		Mean age of Death (years)	
			Men	Women	Men	Woman
All-cause	1,014,039	759.4	769.3	749.5	69.9 (0.0)	76.5 (0.0)
All Aortic Disease	9255	8.1 (1.8)	8.6 (0.3)	5.5 (0.2)	74.3 (0.2)	79.1 (0.2)
Aortic Dissections	2048	1.7 (0.3)	1.9 (0.1)	1.2 (0.1)	64.1 (0.5)	73.3 (0.5)
Thoracic aortic aneurysms	555	0.5 (0.1)	0.4 (0.0)	0.4 (0.0)	73.7 (0.8)	78.0 (0.7)
Ruptured thoracic aortic aneurysms	801	0.6 (0.1)	0.5 (0.0)	0.7 (0.0)	74.3 (0.6)	80.8 (0.5)
Abdominal aortic aneurysms	2225	2.0 (0.8)	2.3 (0.2)	1.1 (0.1)	76.7 (0.3)	81.4 (0.3)
Ruptured abdominal aortic aneurysms	2419	2.1 (0.4)	2.4 (0.1)	1.3 (0.0)	79.4 (0.2)	82.4 (0.3)
Aortic aneurysms, location unspecified	678	0.6 (0.3)	0.6 (0.1)	0.4 (0.0)	75.0 (0.6)	78.8 (0.7)
Ruptured aortic aneurysms, location unspecified	899	0.8 (0.1)	0.8 (0.0)	0.6 (0.0)	76.5 (0.5)	79.7 (0.6)

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #23

### **Accuracy Evaluations of Three Ruptured Abdominal Aortic Aneurysm Mortality Risk Scores Using an Independent Data Set**

Spencer K. Hansen, MD<sup>1</sup>, Patrick Danaher, PhD<sup>2</sup>, H. Whitt Hollis, Jr., MD<sup>1</sup>, Brandon Ty Garland, MD<sup>3</sup>

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<sup>3</sup>Vascular Institute of the Rockies, Denver, CO

**Objective:** Three recently developed scoring systems for predicting 30-day mortality in patients with ruptured abdominal aortic aneurysms (rAAA) have been validated by their respective institutional data. To date, no single score has been endorsed by any vascular society or proven to predict treatment futility. The purpose of this study was to evaluate the accuracy of these rAAA mortality risk scores using an independent community hospital data set.

**Methods:** This study is a retrospective validation of the Dutch Aneurysm Score (DAS), Harborview Medical Group (HMG) score, and Vascular Surgery Group of New England (VSGNE) score using independent data from a prospectively maintained community hospital database. Logistic regression was used to evaluate the association between risk score and odds of death. Confidence intervals for mortality rates were calculated using the Wilson method. Comparisons were made between models by calculating the area under the receiver operating characteristic (AUC) curves.

**Results:** Forty-six patients presented with rAAA during the study period (1/1/2009-2/28/2017). The AUCs for the DAS, HMG and VSGNE scores were 0.762, 0.792, and 0.860 respectively. The difference between scores did not reach statistical significance. All three scores were statistically significantly associated with mortality rate prediction in logistics regression analysis.

**Conclusions:** Each risk score accurately predicted 30-day mortality using the independent data set. The results suggest that the VSGNE score is the most accurate, however this did not reach statistical significance. The HMG score demonstrated accuracy and was based only on preoperative variables. Although the VSGNE score had the highest AUC on this analysis, it is dependent on intraoperative variables. The authors favor the development of a single risk assessment tool, with consensus vascular societal approval, which incorporates preoperative variables and includes a tool for the prediction of treatment futility.



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #24

### **Comparison of Cyanoacrylate (VenaSeal) and Radiofrequency Ablation for Treatment of Varicose Veins in a Canadian Population**

Gary K. Yang, MD, Marina Parapini, MD, Joel Gagnon, MD, Jerry Chen, MD

University of British Columbia, Vancouver, BC

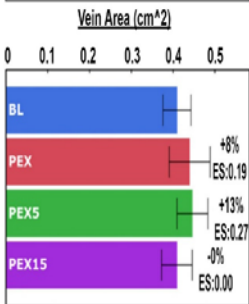
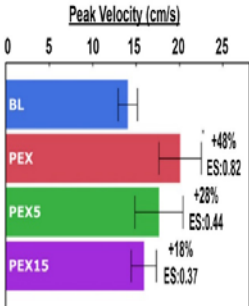
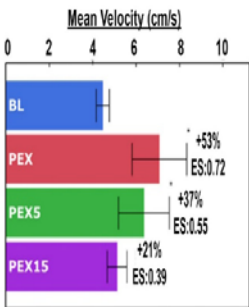
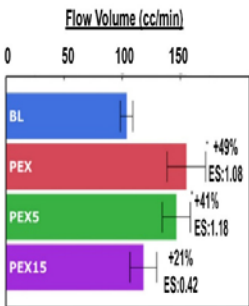
**Objective:** To compare clinical outcomes of cyanoacrylate (CA) and radiofrequency ablation (RFA) in the treatment of varicose veins at our institution.

**Methods:** Between January 2014 to December 2016, 335 patients with 476 venous segments were treated with either CA (n=148) or RFA (n=328) for varicose veins at the Vancouver General Hospital vascular clinic. Charts were reviewed to assess patient demographics, location and severity of disease, treatment details and outcome at short- and mid-term follow-ups. Outcome parameters included treatment success and presence of short- and mid-term complications.

**Results:** The average age of patients were  $57 \pm 1$  years with the majority being female (78%) and an average BMI of  $24.8 \pm 0.5$ . CEAP classes were 2 (49%), 3 (26%), 4a (22%) and >4b (3%). Of the 148 segments treated with CA, the vein types were as follows: 112 greater saphenous vein (GSV), 24 short saphenous vein, 2 accessory greater saphenous vein and 8 perforator veins. The average amount of CA delivered for GSV treatment was  $1.8 \pm 0.1$  ml with a treatment length of  $43 \pm 1$  cm. Subgroup comparison was done for GSV segments. Treatment success was 100% in CA and 99% in RFA. Superficial phlebitis was the most common complication noted at mid-term follow-up in 5% of CA and 16% of RFA treatments. There was one patient in each group that had asymptomatic proximal thrombus extension treated with anticoagulation for two weeks. Three superficial glue protrusions were noted in the CA group requiring minor incision and drainage. Five patients in the RFA group had persistent numbness and 2 had non-healing wounds at the access site.

**Conclusion:** CA is a minimally invasive endovenous technique for treating varicose veins without the need of tumescent analgesia. In our experience, CA offers equivalent success rates with lower mid-term complication rates as RFA.

SCIENTIFIC SESSION ABSTRACTS continued



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #25

### **Pilot Study Evaluating the Efficacy of Exergaming for the Prevention of Deep Venous Thrombosis**

Jayer Chung, MD, MSc, Hadi Rahemi, PhD, Vanessa Hinko, MSc,  
Simon Hoeglenger, MSc, Wendy A. Martinek, RN, RVT,  
Joseph L. Mills, Sr, MD, Bijan Najafi, PhD

Baylor College of Medicine, Houston, TX

**Objectives:** Current prophylactic protocols fail to prevent a significant minority of deep venous thromboses (DVT), a leading cause of preventable hospital death. We therefore quantified the efficacy of novel game-based exercises (exergaming) to augment femoral venous parameters relative to ankle movement and calf muscle flexion.

**Methods:** Healthy volunteers performed a series of ankle and foot exercises by utilizing a wireless foot sensor (LEGSys®, BioSensics LLC, MA) to navigate a computer cursor sequentially on a screen to the center of 200 circular targets. A single ultrasound technician measured each patient's mean flow volume, peak flow velocity, mean flow velocity and cross-sectional area of the right femoral vein (FV) at baseline, immediately post-exercise (PEX), 5, and 15-minutes PEX. Electromyography (EMG) was performed at baseline and during the exercise. Baseline demographics, medical and surgical co-morbidities were also recorded. The primary endpoint was the difference in mean flow volume estimates between baseline and immediately PEX. We secondarily explored the association between baseline characteristics, and EMG measurements with FV parameters.

**Results:** 15 subjects (53% male, 28.1 +/- 4.6 years) completed the exergaming task within a mean of 4 minutes, 2 +/- 21 seconds. Immediately PEX, the FV mean flow volume, mean velocity, peak systolic velocity all increased by 49%, 53%, and 48% respectively ( $p < 0.02$  for each; Figure 1). Mean flow volume and velocity remain significantly elevated 5 minutes PEX ( $p < 0.04$  for each; Figure 1). EMG frequency and intensity did not significantly change while exercising. Neither plantar/dorsiflexion velocities, nor EMG frequency/intensity were significantly correlated with mean flow volume estimates PEX ( $p > 0.05$ ) at any time point. Subgroup analysis revealed that females ( $p < 0.01$ ) and Hispanics ( $p < 0.01$ ) exhibited significantly slower responses PEX.

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** Exergaming successfully guided patients to perform ankle exercises that significantly increased mean flow volume, mean flow velocity, and peak systolic velocity within the FV by approximately 50% above baseline. Exergaming represents a novel, and potentially attractive method of DVT prevention, which will require further validation in larger study bases, among patients at risk of DVT.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #26

### **Validation of Preoperative Predictors of Blood Pressure Response to Renal Artery Stenting**

J. Gregory Modrall, MD<sup>1</sup>, Hong Zhu, PhD<sup>1</sup>, Fred Weaver, MD<sup>2</sup>, Lance D. Dworkin, MD<sup>3</sup>, Donald E. Cutlip, MD<sup>4</sup>, Timothy P. Murphy, MD<sup>5</sup>, Christopher J. Cooper, MD<sup>3</sup>, Robert Toto, MD<sup>1</sup>

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**Background:** The CORAL trial failed to demonstrate a benefit of renal artery stenting (RAS) over medical therapy. Clinical experience suggests that there are patients who benefit from RAS, so multiple studies have sought to identify preoperative markers that portend a higher probability of benefit from RAS. A recent retrospective, single-center study reported three preoperative predictors of blood pressure (BP) response to RAS: 1) requirement for 4 or more anti-hypertensive medications (MEDS); 2) preoperative diastolic BP > 90 mm Hg; and 3) preoperative Clonidine use. The aim of the current study was to validate these predictors utilizing data from the CORAL Trial, which is the largest prospectively collected database on renovascular disease.

**Methods:** This post hoc analysis of the CORAL Trial included 436 patients who were randomized to renal artery stenting. A modification of AHA guidelines was used to categorize patients as BP “responders” or “non-responders”. BP responders were defined by a postoperative BP < 160/90 on a reduced number of anti-hypertensive MEDS or a reduction in diastolic BP to < 90 mm Hg on the same MEDS after RAS. Patients with stable or worsened BP were labeled non-responders. Predictors of BP response were identified by multivariate analysis.

**Results:** The median age was 70 years (IQR, 63-76). The median systolic and diastolic BPs of the stented cohort at baseline were 149 mm Hg (IQR, 132-164) and 78 mm Hg (IQR, 70-87), respectively. A positive BP response occurred in 284 of 436 (65.1%) of stented patients. Multivariate analysis identified 3 independent predictors of a positive BP response: 1) requirement for 4 or more MEDS (Odds Ratio [OR] 5.9; P < 0.001); 2) preoperative diastolic BP > 90 mm Hg (OR 13.9; P < 0.001); and 3) preoperative Clonidine use (OR

SCIENTIFIC SESSION ABSTRACTS continued

4.52;  $P = 0.008$ ). The percent of patients with a positive BP response increased incrementally as the number of predictors per patient increased (Figure 1;  $P < 0.0001$ ).

Conclusions:

The current study independently validates the three previously described clinical predictors of BP response to RAS using data from the CORAL trial. For patients who have failed medical therapy and stenting is contemplated, these clinical predictors may assist clinicians in patient selection and provide more concrete data for counseling patients on the probability of BP improvement.

Figure 1. Number of predictors and blood pressure (BP) response rate. Multivariate analysis identified three predictors of BP response. The numbers of predictors were tallied for each patient. There is a cumulative effect of increasing numbers of predictors on the probability of a BP response to renal artery stenting (with error bars showing 95% confidence intervals).  $P < 0.0001$  (Chi Square for trend).

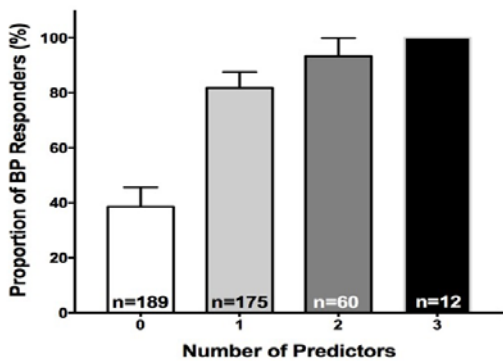


Figure 1. Number of predictors and blood pressure (BP) response rate. Multivariate analysis identified three predictors of BP response. The numbers of predictors were tallied for each patient. There is a cumulative effect of increasing numbers of predictors on the probability of a BP response to renal artery stenting (with error bars showing 95% confidence intervals).  $P < 0.0001$  (Chi Square for trend).

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #27

### **Causes and Outcomes of Finger Ischemia in Hospitalized Patients in the Intensive Care Unit**

Gregory Landry, MD, Courtney Mostul, Bryan McLafferty, MD, Daniel Ahn, MD, Erica Mitchell, MD, Timothy Liem, MD, Enjae Jung, MD, Cherrie Abraham, MD, Amir Azarbal, MD, Gregory Moneta, MD

Oregon Health & Science University, Portland, OR

**Objective:** Vascular surgeons are frequently consulted to evaluate hospitalized patients with finger ischemia. We sought to characterize causes and outcomes of finger ischemia in ICU patients.

**Methods:** ICU patients who underwent evaluation for finger ischemia from 2008-2015 were reviewed. All were evaluated with finger plethysmography (PPG). Patient demographics, comorbidities, ICU care (ventilator status, arterial lines, use of vasoactive medications), finger amputations, and survival were recorded. ICU patients were compared to concurrently evaluated non-ICU inpatients with finger ischemia.

**Results:** 97 ICU patients (54 male, 43 female) were identified. Mean age was  $57 \pm 17$ . 43% were in the surgical and 57% in the medical ICU. 72% had abnormal finger PPGs, 69% unilateral and 31% bilateral. 37% had a radial arterial line. 13% had concomitant toe ischemia. 78% were on vasoactive medications at the time of diagnosis, with the most frequent being phenylephrine (55%), norepinephrine (47%), ephedrine (30%), epinephrine (26%), and vasopressin (25%). Treatment was with therapeutic anticoagulation in 47%, aspirin 52%, and clopidogrel 16%. Other frequent associated conditions included mechanical ventilation (37%), diabetes (33%), peripheral arterial disease (32%), dialysis dependence (31%), cancer (24%) and sepsis (20%). Five patients required finger amputation. 30 day, one and two year survival was 85%, 73% and 65%. By Cox modelling, cancer ( $HR 6.3, p=0.012$ ) and dialysis ( $HR 4.9, p=0.026$ ) were independent predictors of mortality. There were 50 concurrent non-ICU patients with finger ischemia. Non-ICU patients were more likely to have connective tissue disorders (26% vs 13%,  $p=.05$ ), be on antibiotics (38% vs 14%,  $p=.02$ ) and undergo finger amputations (16% vs 5%,  $p=.03$ ).

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** Finger ischemia in ICU patients is often associated with the arterial lines and vasoactive medications, with phenylephrine and norepinephrine most common. While progression to amputation is rare, patients with finger ischemia in the ICU have high mortality, particularly in the presence of cancer or dialysis. Non-ICU patients with finger ischemia more often require amputations, likely due to more frequent connective tissue disorders and finger infections.



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #28

### **Radiation Brain Dose to Vascular Surgeons During Fluoroscopically Guided Interventions is Not Effectively Reduced by Wearing Lead Equivalent Surgical Caps**

Melissa L. Kirkwood, MD, Gary Arbique, PhD, Jeffrey Guild, PhD, Yin Xi, PhD, Katie Zeng, John Rectenwald, MD, Jon Anderson, PhD, Carlos Timaran, MD

University of Texas Southwestern Medical Center, Dallas, TX

**Objectives:** Radiation to the interventionalist's brain during fluoroscopically guided interventions (FGIs) may increase the incidence of cerebral neoplasms. Lead equivalent surgical caps claim to reduce radiation brain doses by 50-95%. We sought to determine the efficacy of the RADPAD® (WIT, Lenexa, KS) No Brainer® surgical cap (0.06 mm lead equivalent at 90kVp) in reducing radiation dose to the surgeon and trainee's head during FGIs and to a phantom to determine relative brain-dose reductions.

**Methods:** OSL nanoDot detectors (Landauer Inc, Glenwood, IL) inside and outside of the cap at the left temporal position were used to measure cap attenuation during FGIs.

To check relative brain doses, nanoDot detectors were placed in 15 positions within an anthropomorphic head phantom (ATOM model 701, CIRS, Norfolk, VA). The phantom was positioned to represent a primary operator performing femoral access. Fluorography was performed on a plastic scatter phantom at 80kVp for an exposure of 5 Gy reference air kerma (RAK) with/without the hat. For each brain location, the percent dose reduction with the hat was calculated. Means and standard errors were calculated using a pooled linear mixed model with repeat measurements. Anatomically similar locations were combined into 5 groups, upper brain, upper skull, mid brain, eyes, and left temporal position.

**Results:** This was a prospective, single center study that included 29 endovascular aortic aneurysm procedures. The average procedure RAK was 2.6 Gy. The hat attenuation at the temporal position for the attending and fellow was 60% $\pm$ 20% and 33% $\pm$ 36% respectively. The equivalent phantom measurements demonstrated an attenuation of 71% $\pm$ 2.0% ( $p < 0.0001$ ). In the interior phantom locations, attenuation was statistically significant for the skull (6% $\pm$ 1.4%) and upper brain (7.2% $\pm$ 1.0%) ( $p < 0.0001$ ) but not for the middle brain (1.4% $\pm$ 1.0%  $p = 0.15$ ) or the eyes (-1.5% $\pm$ 1.4%  $p = 0.28$ ).

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusions:** The No Brainer® surgical cap attenuates direct x-rays at the superficial temporal location, however, the majority of radiation to an interventionalist's brain originates from scatter radiation from angles not shadowed by the cap as demonstrated by the trivial percentage brain dose reductions measured in the phantom. Radiation protective caps have minimal clinical relevance.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #29

### **Very Early CEA Without Shunting for Stroke - The Preferred Therapy**

Niren Angle, MD, RVT, FACS

East Bay Cardiovascular & Thoracic Associates, Danville, CA

**Objective:** There has been an evolution toward early carotid endarterectomy (CEA) after stroke, but there remains a reluctance to perform CEA earlier than 2 weeks. There has also historically been a bias toward shunting for previous stroke. This study analyzed the results of early CEA (< 2 weeks) for stroke patients without shunting over a 12-year period to determine whether CEA earlier than 2 weeks after stroke was safe, and whether a strategy of no-shunting absent neuro-monitoring changes was justified.

**Methods:** A retrospective review of all CEA performed by a single surgeon over a 12-year period was performed. All patients with stroke were included except modified Rankin scale (mRS)- 6. The decision to shunt was based only on defined changes in continuous electroencephalography (EEG)/somatosensory evoked potentials (SSEP) dynamics reflecting ischemia intraoperatively. Patient demographics including age, degree of internal carotid artery (ICA) stenosis, pre-operative neurologic symptoms and medications were reviewed. 30-day outcomes including stroke, TIA, death, and other major complications were tabulated.

**Results:** A total of 432 patients [100 (62.5%) men; mean age 69.4 years, (range 44-91)] underwent a total of 451 carotid endarterectomies. 220 (49%) CEA were for symptomatic disease: of these, 183 had a documented stroke. 162 stroke patients (88%) had the CEA within 72 hours, and the remaining 21 patients within 5 days. Of the stroke cohort, mean pre-CEA mRS was 3.8. 1 patient of this cohort had a new stroke (contralateral). The 72-hour perioperative stroke rate for the whole CEA group was 0.66% (3/451): the 30-day stroke, TIA, death rates were 5(1.1%), 0(0%), 5 (1.1%) respectively. There was 1 intra-operative stroke and the remainder of the 4 strokes occurred within 30 days.

**Conclusions:** Early CEA for stroke, i.e. < 72 hrs., can be performed safely without the need for shunting and does not increase post-operative stroke, morbidity, or mortality. EEG & SSEP monitoring dramatically reduces the need to place a shunt during CEA. Recent stroke, contralateral ICA occlusion or contralateral high grade ICA stenosis are not an indication for intra-operative shunting. CEA for stroke is best done early with no additional increase in peri-operative stroke, thus shielding the patient from the early risk of recurrent stroke.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #30

### **Duration of Asymptomatic Status and Outcomes Following Carotid Endarterectomy and Carotid Artery Stenting in CREST**

Wesley S. Moore, MD<sup>1</sup>, Jenifer H. Voeks, PhD<sup>2</sup>, Gary S. Roubin, MD, PhD<sup>3</sup>, Wayne M. Clark, MD<sup>4</sup>, Virginia J. Howard, PhD<sup>5</sup>, Michael R. Jones, MD<sup>6</sup>, Thomas G. Brott, MD<sup>7</sup>

<sup>1</sup>UCLA Medical Center, Los Angeles, CA, <sup>2</sup>Medical University of South Carolina, Charleston, SC, <sup>3</sup>Cardiovascular Associates of the Southeast, Birmingham, AL, <sup>4</sup>Oregon Health Science University, Portland, OR, <sup>5</sup>University of Alabama at Birmingham, School of Public Health, Birmingham, CA, <sup>6</sup>Baptist Health Lexington, Lexington, KY, <sup>7</sup>Mayo Clinic, Jacksonville, FL

**Objective:** Carotid intervention carries a higher risk in currently symptomatic patients as opposed to asymptomatic patients. Since most carotid revascularization studies define asymptomatic as symptom-free for > 180 days, it is unknown if intervention carries similar risk among those currently asymptomatic but with previous symptoms (PS) versus those who were always asymptomatic (AA). The objective of this report is to compare the early and late risks of intervention between PS and AS patients in the CREST trial.

**Methods:** We compared 30-day and 4-year risk of PS versus AA patients in CREST treated with either endarterectomy (CEA) or stent/angioplasty (CAS). Proportional hazard models adjusting for age and treatment were used to assess risk of 30-day stroke or death (S+D) and risk of any 30-day S+D plus ipsilateral stroke at 4 years. Analysis was performed pooling the CEA-treated and CAS-treated patients, and separately for each treatment.

**Results:** Of 1056 patients who received the assigned procedure within 30 days of randomization, 977 (93%) were AA and 79 (7%) were PS. There was no difference in risk of 30-day S+D when comparing AA and PS in the pooled CAS+CEA population (1.9% vs 1.3%) nor in 30-day S+D plus ipsilateral stroke up to 4 years (3.7% vs 3.1%). There were also no differences among those assigned to CEA (30 days, 1.2% vs 0%; 4 year, 2.7% vs 0%) or CAS (30 days, 2.7% vs 2.6%; 4 year, 4.7% vs 6.3%) when analyzed separately.

**Conclusion:** In CREST, the risk of intervention in previously symptomatic patients reverted to the low risk seen in always asymptomatic patients after a time interval of 180 days.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #31

### **Episode-Based Cost Reduction for Endovascular Aneurysm Repair**

Ronald L. Dalman, MD<sup>1</sup>, Ning Tang, MD<sup>2</sup>, Diana Patterson<sup>2</sup>, Harnoor Jolly<sup>2</sup>, Rika Ohkuma<sup>2</sup>, Matthew W. Mell, MD<sup>1</sup>

<sup>1</sup>Stanford University, Stanford, CA, <sup>2</sup>Stanford Health Care, Stanford, CA

**Objective:** Effective strategies to reduce costs associated with endovascular aneurysm repair (EVAR) remain elusive for many medical centers. In this study, novel interventions to reduce inpatient EVAR costs were identified and implemented.

**Methods:** From June 2015 to February 2016, we analyzed the EVAR practice at a high volume academic medical center to identify, rank, and ultimately reduce procedure-related costs. In this analysis, per-patient direct costs to the hospital were compared before (9/2013 to 5/2015) and after (3/2016 to 1/2017) interventions were implemented. Improvement efforts concentrated on three categories that accounted for a majority of costs: implants, CT scans performed during the index hospitalization, and rooming costs.

**Results:** Costs were compared between 141 pre (PRE) and 47 post-implementation (POST) EVAR procedures. Based on data suggesting that implantable device costs were higher than those at peer institutions, new purchasing strategies were implemented, resulting in a 30.8% decrease in per-case device costs between the PRE and POST periods. Care pathways were modified to reduce utilization and costs for CT scans obtained during the index hospitalization, reducing per-case imaging costs by 92.9% ( $p < 0.001$ ). Alternative rooming arrangements were made for patients traveling long distances the day prior to surgery, resulting in a 50% decrease in utilization rate ( $p = 0.021$ ) without impacting post procedural length of stay. Medication costs also decreased by 38.2% ( $p < 0.001$ ) (Table).

**Conclusions:** Excessive EVAR costs threaten the viability of these procedures in high volume centers. Targeted cost reduction efforts can significantly reduce these costs without compromising quality.

**SCIENTIFIC SESSION ABSTRACTS** continued

Table 1. Index Costs During Admission

Costs	Cost reduction (%)	p-value
Implant	30.8%	
Imaging	93.3%	<0.001
Image processing	99.1%	0.001
Pre-procedural rooming	33.7%	0.161
Pharmacy	38.2%	<0.001

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #32

### **Incidence and Outcomes of Vascular Injury in the Setting of Tibial Plateau Fractures: A Single Center Review**

Sarasijhaa K. Desikan, MD, Alan Swenson, MD, Jake Hemingway, Megan Terle, MD, Prince Esiobu, MD, Sherene Shalhub, MD, Niten Singh, MD, Nam Tran, MD, Elina Quiroga, MD

University of Washington, Seattle, WA

**Objective:** Concern for vascular injury in the setting of tibial plateau fractures is a common consultation to the vascular surgery service. There is no algorithm to predict the likelihood of vascular injury based on fracture type or injury characteristics. The purpose of this study is to determine the incidence of vascular injury in patients with various types of tibial plateau fractures and clinical characteristics on presentation to guide management.

**Methods:** This is a single center retrospective review of consecutive patients with tibial plateau fractures in 2014. The trauma database was queried for ICD-9 codes for tibial fractures. A reviewer blinded to the outcomes determined the fracture type utilizing the Schatzker classification system (Figure 1). Patient demographics, clinical presentation, and outcomes were abstracted.

**Results:** A total of 178 patients (52% male, mean age 49 years, range 15-98) with tibial plateau fractures were identified during the study period. The tibial plateau injuries were classified as follows: Schatzker Type 1 (n=2, 1%), 2 (n=55, 31%), 3 (n=4, 2%), 4 (n=17, 10%), 5 (n=38, 21%), 6 (n=62, 35%). Vascular studies obtained included the following: ABIs (n=87, 49%), arterial duplex (n=21, 13%), CTA (n=16, 9%), arteriogram (n=2, 1%). The incidence of vascular injury was only 2% (n=4). Three of the 4 patients (Schatzker Types 2, 4, 6) presented with Rutherford IIB ischemia and had successful revascularization. The remaining patient (Type 6) was managed nonoperatively with a viable limb in the setting of an anterior tibial artery thrombosis. All patients needing revascularization presented with sensory deficits, motor deficits, and no palpable pulse. Isolated findings of a non-palpable pulse (n=9, 5%), sensory deficit (n=6, 3%), or motor deficits (n=16, 9%) were not predictive of vascular injury (Table 1). Schatzker Types 1, 3, 5 also had no vascular injuries.

SCIENTIFIC SESSION ABSTRACTS continued

**Conclusion:** Vascular injury associated with tibial plateau fracture is a rare event (2%) and when it occurs, it is apparent (Rutherford IIb ischemia). A detailed physical examination can likely identify clinically significant vascular injury, obviating the need for additional costly or urgent diagnostic studies. Further prospective studies are needed to correlate fracture patterns that may be associated with vascular injury.

Figure 1: Schatzker Classification

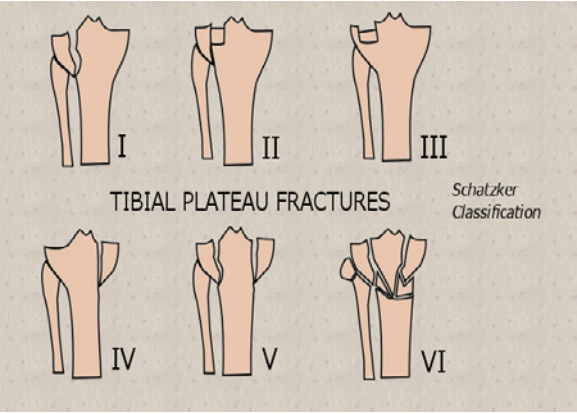


Table 1: Correlation of physical exam findings with presence of vascular injury.			
Exam Findings	No Vascular Injury (n=174)	Vascular Injury with no Operative Intervention (n=1)	Vascular Injury with Revascularization (n=3)
No Palpable Pulse	5% (n=9)	0% (n=0)	100% (n=3)
Sensory Deficits	3% (n=6)	0% (n=0)	100% (n=3)
Motor Deficits	9% (n=16)	0% (n=0)	100% (n=3)
All 3 Findings	0% (n=0)	0% (n=0)	100% (n=3)



## SCIENTIFIC SESSION ABSTRACTS continued

Presentation #33

### **Limb Salvage and Functional Limb Outcomes After Traumatic Acute Limb Ischemia**

Shahram Aarabi, MD, MPH, David Emanuels, BS, Prince Esiobu, MD, Elina Quiroga, MD, Nam Tran, MD, Benjamin Starnes, MD, Niten Singh, MD

University of Washington, Seattle, WA

**Objective:** We describe a contemporary series of patients with acute limb ischemia (ALI) secondary to trauma and review factors associated with limb salvage (LS) and functional limb outcomes at a tertiary referral center for a multi-state geographic area.

**Methods:** A retrospective review of all patients with upper extremity (UE) and lower extremity (LE) ALI secondary to trauma and requiring revascularization at a single institution was conducted from 2013-2016. Demographic data, transfer timing, injury severity score (ISS), Rutherford classification (RC), pre-operative imaging, level of occlusion, procedural information, fasciotomy characteristics, and discharge disposition were reviewed. Outcome measures included LS and functional limb outcomes.

**Results:** 68 patients with traumatic ALI were identified (Table 1). The majority of patients had moderate ISS scores, were RC 2 on presentation (65%), were transferred from another institution (53%), and underwent preoperative imaging (62%) with expeditious time to operation (median 4.5h). The most common location of vascular injury for UE was axillary-brachial (88%) and for LE was femoral-popliteal (69%). Open vascular procedures dominated the treatment strategy and the median number of operations was 3 (Table 2). Fasciotomy was performed in 25% of UE and 58% of LE injuries. Shunts were utilized in only 2 patients. Overall LS was 94% for UE and 78% for LE. RC and the number of operations performed were independent predictors of amputation and functional limb at follow-up in our logistic regression model ( $p < 0.05$ ). The median LOS was 11 days and 25% of patients were discharged to a skilled nursing facility. 59% of patients presented for follow-up and for upper extremity injuries 57% of patients had no or minimal functional deficits while 33% had major functional deficits and 10% had undergone amputation. For lower extremity injuries 68% of patients had no or minimal functional deficits while 6% had major functional deficits and 26% had undergone amputation.

## SCIENTIFIC SESSION ABSTRACTS continued

**Conclusion:** Revascularization for traumatic ALI yields high LS in patients with RC 1 and 2 ischemia as well as in patients with UE injuries. However, LS does not necessarily equate to good functional outcomes, likely signifying the complex injuries in these patients requiring multiple operations to attain LS.

Table 1. Patient Demographics

Patient Characteristics	Upper (n=32)	Lower (n=36)
Median age in years (IQR)	36 (29-60)	46 (28-62)
Male (%)	81	84
Median ISS (IQR)	13 (9-24)	13 (10-25)
Transferred from another hospital (%)	58	51
Median transfer time in hours (IQR)	2.7 (0.7-9.2)	3.2 (1.5-13.6)
Median time to operating room in hours (IQR)	4.5 (1.9-8.7)	4.5 (2.4-7.0)
Pre-operative CT (%)	55	68
Rutherford Classification		
1 (%)	35	19
2a (%)	23	27
2b (%)	39	41
3 (%)	3	14
Venous Injury (%)	25	17
Level of Injury		
Aortoiliac (%)		3
Femoral-popliteal (%)		69
Tibial (%)		11
Aorto-subclavian (%)	6	
Axillary-brachial (%)	88	
Multilevel (%)	6	17

SCIENTIFIC SESSION ABSTRACTS continued

Table 2. Treatments and Results

Patient Characteristics	Upper (n=32)	Lower (n=36)
Median number of operations performed (IQR)	3 (2-4)	3 (3-5)
Rutherford 1	2 (1-3)	3 (1-4)
Rutherford 2a	3 (2-4)	4 (3-6)
Rutherford 2b	3 (1-7)	4 (3-8)
Rutherford 3	3 (3-3)	3 (2-5)
Type of Procedure		
Open (%)	84	69
Endovascular (%)	9	17
Hybrid (%)	6	14
Fasciotomy (%)	25	58
LS overall (%)	94	78
LS for Rutherford 1 (%)	100	100
LS for Rutherford 2a (%)	100	80
LS for Rutherford 2b (%)	92	80
LS for Rutherford 3 (%)	0	40

### ePoster 2

#### **Contemporary Reconstructive Vascular Procedures Augment Resectability of Primary and Recurrent Neoplasms**

Ramsey S. Elsayed, MD, Michael E. Bowdish, MD, Sukgu M. Han, MD, Sung W. Ham, MD, Siamak Daneshmand, MD, Vincent L. Rowe, MD, Fred A. Weaver, MD

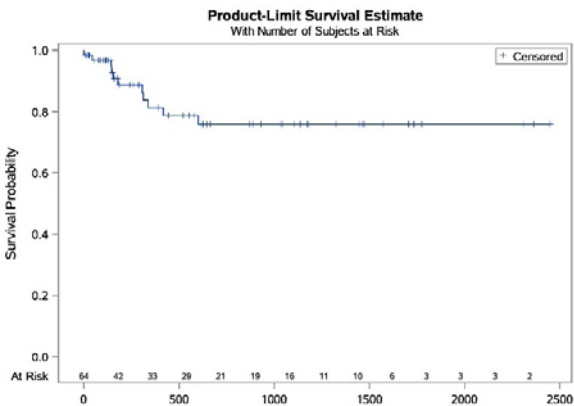
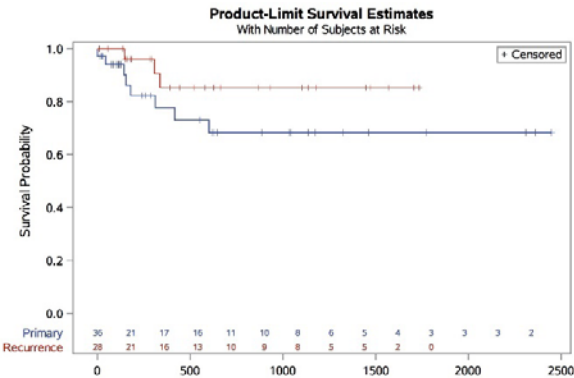
Keck Medical Center of USC, Los Angeles, CA

**Objective:** Tumor invasion into major vascular structures may render neoplasms unresectable. The aim of this study was to examine outcomes following resection of primary and recurrent neoplasms that required concomitant vascular reconstruction.

**Methods:** This is a retrospective review of patients undergoing revascularization in the setting of primary or recurrent tumor resections at our institution between 1/2010 and 12/2016. Data regarding patient characteristics, tumor location and histology, vascular reconstruction, and perioperative and long-term outcomes were collected. Logistic regression was used to model survival; survival was analyzed by Kaplan-Meier methods.

**Results:** Seventy-seven reconstructions were performed in 64 patients (39 male). Aortic resection with graft reconstruction was performed in 13 (20%), revascularization of iliac, femoral, or popliteal vessels in 27 (42%), portal vein in 14 (22%), inferior vena cava in 6 (9%), brachiocephalic vessels in 7 (11%), and visceral branches in 10 (16%). Tumor location was abdominal in 27 (42%), pelvic in 24 (38%), extremity in 8 (12.5%), and neck in 5 (7.5%). Intraoperative consultations occurred in 40% of patients. Revascularization was performed in the setting of a primary tumor in 56% and a recurrence in 44%. Thirty-day mortality was 1.5% and thirty-day vascular morbidity occurred in 3 patients. Seven patients required another operation for tumor recurrence. Primary patency of vascular reconstruction at 24 months was 95% and tumor-free survival was 78%. Overall mortality was 17%. Mean follow-up time was 22 ± 21 months. One-year and 3-year survival were 81.3 and 75.8%, respectively (Figure 1). There was no difference in survival between primary and recurrent tumors (Figure 2). Tumor location was not predictive of survival ( $p=0.39$ ).

**Conclusion:** Reconstructive vascular procedures can safely allow resection of primary or recurrent malignant neoplasms which would otherwise be deemed unresectable with acceptable early and late morbidity and mortality. We advocate the active involvement of vascular surgery in oncologic



### ePoster 3

#### **Ultrasound-Accelerated Catheter-Directed Thrombolytic Therapy for Acute Pulmonary Embolism in Children**

Lauren E. Jones, MS<sup>1</sup>, Elias Kfoury, MD<sup>1</sup>, Angela Echeverria, MD<sup>1</sup>, Carlos Bechara, MD<sup>2</sup>, Joseph Varon, MD<sup>3</sup>, Stanley M. Duchman, MD<sup>2</sup>, Peter H. Lin, MD<sup>1</sup>

<sup>1</sup>Baylor College of Medicine, Houston, TX, <sup>2</sup>Houston Methodist Hospital, Houston, TX, <sup>3</sup>University of Texas Health Science Center, Houston, TX

**Objective:** Ultrasound-accelerated catheter-directed thrombolytic therapy (UACDT) has been shown to be effective in patients with acute symptomatic pulmonary embolism (PE). Clinical experience of this treatment in pediatric patients is scarce. The aim of this study was to review our experience of UACDT in children with acute symptomatic PE.

**Methods:** A retrospective review of pediatric patients who underwent UACDT for PE from 2005 to 2016 was performed using a prospectively collected database. Echocardiographic evaluation of the right ventricular function using right ventricle to left ventricle (RV/LV) diameter ratio assessment was performed in the most recent six patients within 24 hours of procedural initiation and at 6 months follow-up.

**Results:** A total of 17 patients (7 male, mean age  $15 \pm 3.4$  years) with symptomatic PE underwent 20 ultrasound-accelerated CDT during the study period. All patients exhibits signs of cardiogenic shock (29%), ventricular dysfunction (47%), or hemodynamic instability (59%). Among them, acute massive and submassive PE occurred in 12 (71%) and 6 (29%) patients, respectively. Technical success was achieved in all patients (100%). The mean thrombolytic dose with tissue plasminogen activator was  $15.5 \pm 3.6$  mg using ultrasound-accelerated thrombolytic infusion catheter with an average treatment time of  $18.6 \pm 4.6$  hours. Clinical success was achieved in 16 patients (94%; 95% CI, 92.4%-99.5%). Measurements before and after UACDT showed a reduction of pulmonary artery pressure from  $54.5 \pm 14.2$  to  $33.5 \pm 11.5$  mmHg ( $p=0.001$ ). The median value of RV/LV diameter ratio decreased from 0.9 (0.7-1.2) at baseline to 0.7 (0-0.03) at 6-month follow-up ( $p=0.001$ ) and pulmonary artery pressure from  $61.4 \pm 16.7$  to  $37.2 \pm 9.1$  mmHg ( $p=0.001$ ). There was one bleeding complication with groin hematoma which required blood transfusion ( $n=1$ , 6%). All-cause mortality at 30 days was 0%. There were no readmissions for PE at 30 days after discharge. During the mean follow up period of 32 months, no patient developed recurrent PE.

**Conclusions:** Ultrasound-accelerated catheter-directed thrombolysis is safe and effective in children with acute massive or submassive PE. This treatment can reverse right ventricular dysfunction and reduce pulmonary hypertension in pediatric patients.

ePoster 4

### **Aortic Neck Dilation is Safe and Not Associated with Adverse Outcomes Following Fenestrated EVAR**

Sayed M. Qaderi, MD<sup>1</sup>, Nam T. Tran, MD<sup>2</sup>, Billi Tatum, RN<sup>2</sup>,  
Jan Blankensteijn, MD, PhD<sup>1</sup>, Niten Singh, MD<sup>2</sup>, Benjamin W. Starnes, MD<sup>2</sup>

<sup>1</sup>VU Medical Center, Amsterdam, Netherlands, <sup>2</sup>University of Washington, Seattle, WA

**Objective:** Long-term device durability after EVAR is threatened by aortic neck dilation (AND), graft migration, and endoleak. To improve proximal neck fixation and reduce the risk of migration and endoleak, most device manufacturers recommend device oversizing of 10 to 20%. In the US, more than 40-50% of patients undergoing EVAR are treated outside the device IFU and aneurysm sac enlargement is high in this group. Fenestrated EVAR (FEVAR) allows repair for a broader patient population, who would otherwise be ineligible for open repair. We sought to determine the rate of AND and the occurrence of endoleaks following FEVAR.

**Methods:** 77 subjects presenting with juxtarenal abdominal aortic aneurysms treated with FEVAR that received complete follow-up were included. Analysis of CT images was performed on a 3-D workstation. Aortic neck diameter was measured at the lowest patent renal artery. Significant AND was defined as > 3 mm increase between baseline and follow-up and sac regression > 5 mm was considered significant. The rate of AND was measured comparing baseline (subject's 1-month initial postop CT) with measurements done at 6 m, 12 m and annually thereafter to 4 yrs. Baseline patient characteristics and device information were obtained from our prospective IDE database (#NCT01538056).

**Results:** 75% of the patient cohort were men with mean age of  $74 \pm 7.9$  years. Median pre-op aneurysm size was 62 (57-73) mm and median follow-up was 12(3.5-30) months. Median infrarenal neck length was 4.5mm (2-7). Mean endograft oversizing was  $17 \pm 12.5\%$ . Mean seal zone length was 41mm. At 1-year follow-up, the median aortic neck diameter increase was 1.7(0-3) mm. Maximum aneurysm size decreased dramatically during the first post-op year with significant sac regression in 65% of subjects (Figures 1 and 2). AND at 1 year did correlate positively with the percentage of device oversizing. Importantly, no cases of type 1A endoleak were noticed during and up to 4-years of follow-up regardless of original device oversizing <10% or >20%.

**Conclusions:** After endovascular repair with FEVAR, the aortic neck continues to dilate, but it does not exceed the device diameter at any point during follow-up. With an average seal zone length of 41 mm and no type 1A endoleaks reported, we believe less oversizing may be acceptable with the same clinical outcome.

ePoster 5

### **Cardiac Abnormalities Detected by Transthoracic Echocardiography in Patients with Type B Aortic Dissection**

Alexander Taylor, MD, Rosario Freeman, MD, MS, Matthew Bartek, MD, MPH, Sherene Shalhub, MD, MPH

University of Washington, Seattle, WA

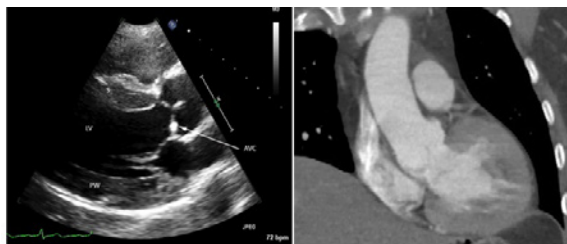
**Objective:** There is a paucity of data on cardiac abnormalities associated with type B aortic dissection (TBAD). While routine in some practices, providers at our institution do not obtain transthoracic echocardiograms (TTEs) on all patients with TBAD in the acute or subacute phase. We aimed to describe cardiac abnormalities detected by TTE, and determine if TTE should be included in the initial workup of TBAD.

**Methods:** This is a single center retrospective review of patients with acute TBAD from 2000 to 2015. Clinical and TTE data were abstracted for studies obtained within 6 weeks of dissection. Congenital and valvular abnormalities, cardiac function and stigmata of hypertensive heart disease were ascertained. Characteristics and outcomes of patients with and without left ventricular hypertrophy (LVH) on TTE were compared.

**Results:** Of 238 patients with TBAD, 95 (40%) had TTEs (75% male). Studies were obtained at a median of 2 (range 1-42) days from TBAD. Patients with TTE did not differ in age, gender or comorbid conditions when compared to those without TTE. TTE patients had longer hospital stays ( $14 \pm 12$  vs.  $10 \pm 9$  days,  $p < 0.01$ ), were less likely to be Caucasian (64% vs. 76%,  $p = 0.04$ ) and tended to undergo open surgical or endovascular aortic repair at a higher rate (30% vs. 21%,  $p = 0.34$ ). There were no congenital abnormalities, and advanced pathology of the mitral and aortic valves was uncommon (Table 1). Left ventricular ejection fraction was normal ( $\geq 60\%$ ) in 81% of patients. LVH (Figure 1) was common. A comparison of those with and without LVH showed equal mean descending thoracic aortic diameter at TBAD ( $3.7 \pm 0.8$  cm), and higher admission diastolic blood pressure in patients with LVH (Table 2). Patients with LVH had more pericardial effusions, and tended to have more retrograde dissections and longer hospital stays. LVH patients tended to have higher mortality and younger age at death despite a similar age of TBAD onset.



**Conclusions:** Stigmata of hypertensive heart disease are common in patients with TBAD even without a history of hypertension. While this study is underpowered, these exploratory findings demonstrate seemingly worse TBAD outcomes in patients with LVH. Further study is warranted to assess LVH as a potential novel biomarker for long-term complications from TBAD.



**Figure 1.** The left panel shows a parasternal long axis TTE view of the left ventricle (LV) in a patient with type B dissection with findings of chronic hypertension. Both septal (S) and posterior wall (PW) thickness are greater than 1.5 cm (referenced to 1 cm spaced tick marks along right side of the image), consistent with moderate concentric hypertrophy. There is mild aortic valve calcification (AVC, arrow). The right panel shows a coronal computed tomographic slice from the same patient demonstrating concentric LV hypertrophy.

ePoster 6

### **The Effects of Regional and General Anesthesia on Infrainguinal Bypass Surgery Outcomes**

Michael D. Sgroi, MD, Graeme McFarland, MD, Matthew Mell, MD  
Stanford University, CA

**Objective:** Previous studies evaluating general anesthesia (GA) versus regional (epidural/spinal) anesthesia (RA) for infrainguinal bypass have produced conflicting results. The purpose of this study was to analyze the factors associated with the use of RA and to determine if RA is associated with improved outcomes after infrainguinal bypass in patients with critical limb ischemia (CLI).

**Methods:** Using the Vascular Quality Initiative Infrainguinal database, a retrospective review identified all critical limb ischemia patients who received an infrainguinal bypass from 2011 through 2016. Patients were then separated by general or regional anesthesia. Primary outcomes were perioperative mortality, complications, and length of stay (LOS). Predictive factors for RA and perioperative outcomes were analyzed using a multiple regression to adjust for center differences.

**Results:** After exclusions, 16,057 patients were identified with 573 (3.57%) receiving regional anesthesia. By center, wide variation was observed in the use of regional anesthesia (median 0.87%; IQR 0-3.57%). Over 30% of centers not use RA, and 5% of centers used RA for >20% of cases. By multivariate analysis, age (OR=1.03; 95% CI=1.023-1.041 [p=<0.001]) and COPD (OR=1.27; 95% CI=1.03-1.56 [p=0.02]) were more likely to receive RA, while those on dual anti-platelet agents less likely (OR 0.70; 95% CI 0.50 - 0.99 [p=0.045]). RA was associated with shorter LOS (5.7 days vs. 6.8 days; p < 0.01), and lower rates of postoperative CHF (1.05% vs. 2.36%; p=0.04) or renal injury (2.97% vs. 5.72%; p=0.005). These differences remained significant after adjusting for cohort differences (LOS: =-0.78; 95% CI=-0.41 to -1.16 [p<0.001]; EBL: =-44; 95%CI=-25 to -64 [p<0.001]; CHF: OR=0.41; 95% CI 0.18-0.94 [p=0.035]; Renal: OR 0.52; 95%CI = 0.32-0.85 [p=0.01]) There was a trend towards lower mortality rates, however, this did not reach statistical significance. Rates of MI, pneumonia, and stroke were equivalent.

**Conclusions:** JRA is an infrequently used but effective and safe form of anesthesia for infrainguinal bypass surgery. Elderly and frail patients may benefit from this form of anesthesia. Further evaluation within institutions is warranted to confirm the outcome benefits and measure its impact on utilization of resources.

ePoster 7

### **Establishing Branch Angle Boundary Conditions in Fenestrated-Branched Endografts**

Jamil A. Matthews, MD, MS, Matthew P. Sweet, MD, MS

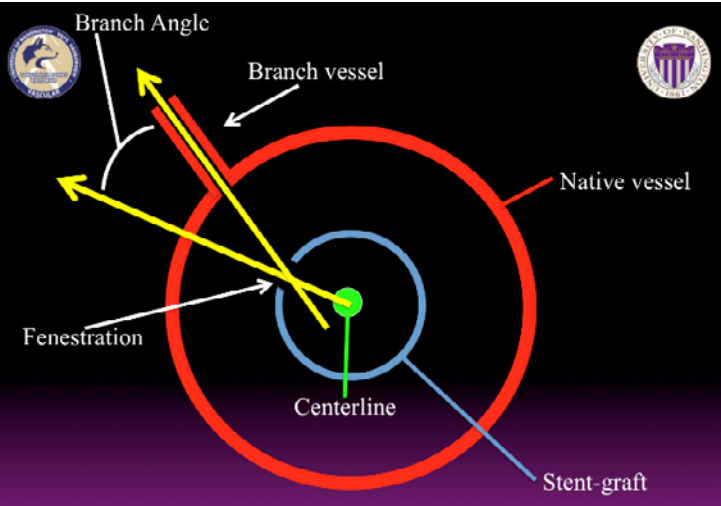
University of Washington School of Medicine, Seattle, WA

**Objective:** Branched thoracic endovascular aneurysm repair (B-TEVAR) is an evolving technique for the repair of thoraco-abdominal aneurysms. B-TEVAR use either an axially oriented cuff (branch) or a reinforced fenestration (fenestrated-branch) to mate with the branching stent. The devices are subject to longitudinal and rotational forces that effect wall shear stress, device integrity, and ultimately, branch patency. The purpose of this study was to assess branch angulation of fenestrated-branched endografts to determine boundary conditions of this construct.

**Methods:** This study was a retrospective review of post-operative CT scans from 40 patients treated with a physician modified fenestrated-branched endograft from December 2012 to September 2016 within an FDA approved IDE study. The degree of branch deviation for the celiac, superior mesenteric and bilateral renal arteries (n = 156) relative to the vertical and horizontal axis of the main body were measured in the coronal, sagittal and axial planes on a 3-D imaging workstation (Tera Recon, Foster City, CA). Statistical analysis was performed using Stata.

**Results:** The mean rotational and vertical deviations for the celiac, superior mesenteric, left renal and right renal arteries are 27.7, 16.7, 15.6, 30.6 and 28.1, 33.5, 18.9, 24.7 degrees respectively. 153 branches (98%) were successfully implanted. Three renal branches could not be successfully implanted, all of which had an angle of deviation exceeding 70 degrees in at least 1 plane. One other branch with a 70 degree deviation dislodged immediately post-operation. All 21 branches (14%) with angles of deviation between 45 and 70 degrees were successfully implanted. Over a mean 16 month follow up (range 1-44) no branches have fractured, migrated, or occluded.

**Conclusion:** Fenestrated-branched endografts tolerate a wide range of branch angle deviation. Extremes of deviation were associated with failure of branch implantation, although this was also impacted by target vessel anatomy. These data contribute to establishing boundary conditions of branched and fenestrated-branched endografts, and demonstrate the adaptability of the construct to varying aortic anatomy.



ePoster 8

**Regional Nerve Block Versus Local Anesthesia for Arteriovenous Fistula Creation: A Comparison of Early Thrombosis and Fistula Maturation**

Kelsey Gray, MD<sup>1</sup>, Abraham Korn, MD<sup>1</sup>, Corinne Jansen<sup>2</sup>, Joshua Zane<sup>3</sup>,  
Amy Kaji, MD, PhD<sup>1</sup>, Nina Bowens, MD<sup>1</sup>, Christian de Virgilio, MD<sup>1</sup>

<sup>1</sup>Harbor UCLA, Torrance, CA, <sup>2</sup>UCLA David Geffen School of Medicine, Los Angeles, CA, <sup>3</sup>University of Washington, Torrance, CA

**Objective:** Use of regional nerve block for dialysis access creation has been shown to increase vessel diameter and perioperative flow rates through the fistula; however, there has been much discussion about whether this translates to improved outcomes. The purpose of this study is to evaluate patients undergoing arteriovenous fistula (AVF) creation who received local anesthesia versus regional nerve block to determine whether there is a difference in early thrombosis and clinical maturation.

**Methods:** This is a retrospective review of patients who underwent dialysis access surgery at a single institution between January 2011 and June 2016 and received either local anesthesia or a regional nerve block. All grafts were excluded for the comparison analysis. The primary outcomes were rate of early thrombosis and clinical maturation. The groups were further assessed for radiocephalic fistula creation as well as rate of early thrombosis and clinical maturation in the radiocephalic fistula group.

**Results:** There were 694 patients identified of which 646 (93.1%) received an AVF, 437 (63.2%) were already on hemodialysis, and 392 (56.5%) had a prior AVF. Forty patients were lost to follow up (5.7% local vs 5.9% regional p=1.0) which were excluded. Of the remaining 606 patients, 17 (2.8%) had early thrombosis and 553 (91.3%) achieved maturation. There were 90 (14.9%) patients that received regional anesthesia and 516 (85.1%) that received local anesthesia. There was no difference between local and regional anesthesia in the rate of early thrombosis (2.7% vs 3.3% p=0.7) or maturation (91.5% vs 90.0% p=0.6). There was also no difference between the groups in radiocephalic fistula creation (28.7% vs 22.2% p=0.2). For the radiocephalic group, there was also no difference between local and regional anesthesia in the rate of early thrombosis (6.1% vs 0% p=0.6) or maturation (85.1% vs 85% p=1.0).

**Conclusions:** Despite the promising physiologic changes observed with the use of a regional nerve block for dialysis access creation, there is no improvement in rates of early thrombosis or clinical maturation when compared to local anesthesia. Further, regional anesthesia did not result in a higher rate of radiocephalic fistula creation, and there was no difference in rates of maturation or early thrombosis for the radiocephalic fistula group.

ePoster 9

### **Brachial Artery Vasoreactivity in Patients with Venous Thromboembolism**

Elias Kfoury, MD<sup>1</sup>, Tamuru Okada, MD, PhD<sup>2</sup>, Carlos Bechara, MD<sup>3</sup>,  
Angela Echeverria, MD<sup>1</sup>, Joseph Varon, MD<sup>4</sup>, Peter Lin, MD<sup>1</sup>

<sup>1</sup>Baylor College of Medicine, Houston, TX, <sup>2</sup>California Institute of Technology, Pasadena, CA, <sup>3</sup>Houston Methodist Hospital, Houston, TX, <sup>4</sup>University of Texas Health Science, Houston, TX

**Objective:** Venous thromboembolism (VTE), a process involving thrombus formation in the venous circulation which can lead to deep vein thrombosis (DVT) or pulmonary embolism (PE), is associated with high risk of morbidity and mortality. The aim of this study was to evaluate the vascular reactivity of patients with acute symptomatic DVT or PE.

**Methods:** Brachial artery reactivity (BAR) was measured prospectively in 17 patients with acute VTE due to either symptomatic iliofemoral DVT and acute massive PE who all underwent catheter-directed thrombolytic therapy. BAR measurements were conducted within 24 hours of thrombolytic therapy. Follow up BAR measurement was done at 6 months. Sixteen healthy volunteers served as the control group. Comparisons were made between VTE patients versus control subjects.

**Results:** Ten patients with acute massive PE (60% male, mean age  $54 \pm 13$  years) and seven patients with iliofemoral DVT (43% male, mean age  $47 \pm 12$  years) who all underwent catheter-directed thrombolytic therapy were included in the study. Technical success was 100% in both groups. The mean treatment duration was  $23 \pm 4.3$  and  $19 \pm 5.7$  hours, respectively. The baseline brachial artery diameter was smaller in PE and DVT patients compared with controls. The absolute change in diameter post hyperemia was significantly less in both PE and DVT patients compared to control subjects ( $0.006 \pm 0.04$ cm and  $0.009 \pm 0.06$ cm vs.  $0.07 \pm 0.03$ cm,  $p < 0.001$ ). Both PE and DVT patients responded to hyperemia by constriction instead of dilatation (FMD% was  $-0.7 \pm 7.4\%$  in patients vs.  $17.4 \pm 8.2\%$  in controls,  $p < 0.001$ ). During the follow up period, 90% of DVT patients showed improvement of brachial artery diameter and flow-mediated vasodilation, in contrast to 44% of PE patients who showed improvement of brachial artery diameter and flow-mediated vasodilation ( $p < 0.03$ ).

**Conclusions:** Patients with VTE due to acute PE or DVT have narrowed brachial arteries with impaired ability to respond to high shear stress that triggers nitric oxide dependent flow-mediated dilatation. Following successful thrombolytic therapy, patients with DVT are more likely to improve their brachial artery reactivity compared to PE patients.

ePoster 10

### **Subjective vs. Objective Assessment of Surgical Proficiency During Vascular Anastomosis**

Nestor Arita, MD<sup>1</sup>, Alejandro Zulbaran, BSc<sup>2</sup>, Hadi Rahemi, PhD<sup>1</sup>, Javad Razjouyan, PhD<sup>1</sup>, Bijan Najafi, PhD<sup>1</sup>, Joseph Mills, MD<sup>1</sup>, Ramyar Gilani, MD<sup>1</sup>

<sup>1</sup>Baylor College of Medicine, Houston, TX, <sup>2</sup>Universidad Popular Autonoma del Estado de Puebla, Puebla, Mexico

**Objectives:** Surgical trainees are challenged with gaining technical proficiency in the setting of work hour limitations. Multiple subjective surgical assessment schema have been validated as tools to grade technical proficiency. Hand motion analysis using wearable sensors is evolving as an objective tool for grading surgical performance. The purpose of this study was to compare subjective and objective measures of surgical training performance.

**Methods:** Surgeon volunteers regardless of experience at our institution were recruited and performed a vascular anastomosis on a physical model. A modified objective structured assessment of technical skill (mOSAT) was used for subjective qualification. Flexible wearable sensors (Biostamp RCTM, mc10 Inc., Lexington, MA) were placed on the dorsum of both hands (recording 3D linear accelerations and angular velocity). Total distance traveled, total time for task completion (tTask), number of hand movements and the ratio of dominant hand to non-dominant hand movements (rMov) was calculated and compared among the mOSAT score.

**Results:** There were a total of 18 participants categorized into two groups experts (n = 10) and non-experts (n = 8) based on the median (9) of mOSAT score. The mOSAT had significant correlation with tTask ( $r = -0.66$ ,  $p = 0.003$ ), number of non-dominant hand movements ( $r = -0.74$ ,  $p < 0.001$ ), total path of dominant hand ( $r = -0.62$ ,  $p = 0.006$ ), rMov ( $r = 0.69$ ,  $p = 0.002$ ), and years of experience ( $r = 0.83$ ,  $p < 0.001$ ). Total time (44%,  $p = 0.003$ ) and number of non-dominant hand movements (57%,  $p = 0.005$ ) were significantly lower in the expert group while rMov (52%,  $p = 0.016$ ) and years of experiences (69%,  $p < 0.001$ ) in the expert group was significantly higher compared to the non-expert group.

**Conclusions:** The objective and the subject assessments appear to have moderate to strong correlation. The mOSAT is not sensitive to small improvements of proficiency while the objective measures appear more sensitive to the subtle gains. Future studies are needed to investigate sensitivity of both approaches.

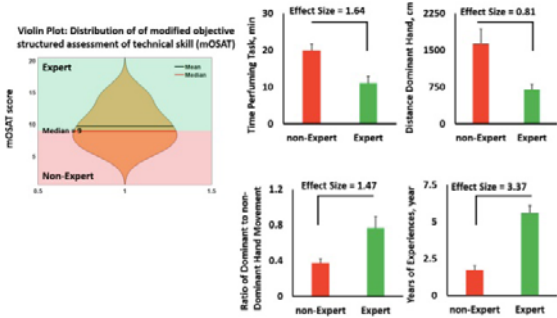


Figure 1. Grouping the participants into two groups of expert and non-expert based on the median score of the modified objective structured assessment of technical skill (mOSAT).





# CONSTITUTION & BYLAWS

# 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

## CONSTITUTION & BYLAWS continued

Mexico, Oklahoma, Oregon, Utah, Washington, Wyoming, Alberta, British Columbia and the Pacific Rim.

3. There shall be five types of members: active, senior, honorary, associate, and adjunct.
4. Active membership shall consist of the following members of the Organization plus subsequent individuals elected to membership by the Society. The total number of active members shall be limited to 160.
  - 4a. Prospective members should have completed a minimum of two (2) years of practice after vascular surgery training before applying for membership.
  - 4b. The prospective member should meet one or more of the following three (3) criteria in order to be considered for membership:
    - Excellence in Clinical Care - this can be reflected by letters from colleagues and collaborators, regional reputation, years in practice, peer-recognition awards (Chief of Staff, senior surgeon in group, HMO recognition award), service on peer-review organizations, case lists and outcomes, community involvement or participation in clinical trials.
    - Contributions to Vascular Science - this can be reflected by peer-review publication, non-profit or federal grant support, invited lectures, professorships, faculty appointments, invited publications, participation in clinical trials, device development, active participation in local/regional vascular societies or serving on hospital committees.
    - Contributions to Vascular Education - this can be reflected by teaching responsibilities at a vascular or general surgery training program, hospital grand rounds, seminars, proctorship of new vascular procedures or other lectureships.
5. Senior members shall consist of active members who have reached the age of sixty-five (65) or who for reasons of health or other just cause, the Council recommends for classification in this category. Senior members shall not be bound by requirements for attendance at meetings; however, working senior members shall continue to pay

## CONSTITUTION & BYLAWS continued

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.

## CONSTITUTION & BYLAWS continued

- 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

## CONSTITUTION & BYLAWS continued

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.

## CONSTITUTION & BYLAWS continued

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,

## CONSTITUTION & BYLAWS continued

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.



# CONSTITUTION & BYLAWS continued

## 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

## CONSTITUTION & BYLAWS continued

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

## CONSTITUTION & BYLAWS continued

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

## **CONSTITUTION & BYLAWS** continued

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.

## **CONSTITUTION & BYLAWS** continued

### **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.

## CONSTITUTION & BYLAWS continued

### 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.

## CONSTITUTION & BYLAWS continued

### 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*

## CONTACT INFORMATION



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The Western Vascular Society wishes to thank the following companies for their educational grants in support of the 32nd Annual Meeting.

**Cook Medical**  
**Gore & Associates, Inc.**  
**Medtronic**

The Western Vascular Society wishes to thank the following companies for exhibiting in support of the 32nd Annual Meeting.

PLATINUM  
**Abbott Vascular**  
**Cook Medical**  
**Gore & Associates**  
**Medtronic**

GOLD  
**Getinge Group**  
**LifeNet Health**

SILVER  
**Boston Scientific**  
**Bolton Medical**  
**Endologix, Inc.**  
**Penumbra**  
**Silk Road Medical**  
**Vascular Insights**