



# WESTERN VASCULAR SOCIETY

## **31st Annual Meeting**

September 24 - 27, 2016

The Broadmoor | Colorado Springs, CO

[www.westernvascular.org](http://www.westernvascular.org)

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## OFFICERS AND COMMITTEES

### OFFICERS

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

### PROGRAM COMMITTEE

**Niten Singh, MD**..... Chair  
**Mark R. Sarfati, MD**  
**Wei Zhou, MD**  
**Christopher Owens, MD**  
**William C. Pevec, MD**..... President (Ex-Officio)  
**Steven Katz, MD**..... President-Elect (Ex-Officio)  
**York N. Hsiang, MB, MHSc**..... Secretary-Treasurer (Ex-Officio)  
**Benjamin W. Starnes, MD**..... Recorder (Ex-Officio)

### MEMBERSHIP COMMITTEE

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

### WVS REPRESENTATIVE TO THE SVS

**York N. Hsiang, MB, MHSc**

### LOCAL ARRANGEMENTS CHAIRMAN

**Omid Jazaeri, MD**

## 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

## SECRETARIES-TREASURERS

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

## RECORDERS

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

## NEW MEMBERS ELECTED IN 2015

Venita Chandra, MD

David Frankel, MD

Nasim Hedayati, MD

Kelley D Hodgkiss- Harlow, MD

Susanna H. Shin, MD

Osvaldo J.Yano, MD

## WVS PRESIDENTIAL GUEST LECTURERS

1986	<b>Emerick Szilagyi</b>	2004	<b>None</b>
1987	<b>None</b>	2005	<b>Kevin G. Burnand</b>
1988	<b>James Stanley</b>	2006	<b>Jean Pierre Becquemin</b>
1989	<b>Brian Thiele</b>	2007	<b>None</b>
1990	<b>Frank Veith</b>	2008	<b>John H. N. Wolfe</b>
1991	<b>Allan Callow</b>	2009	<b>Jack L. Cronenwett</b>
1992	<b>Malcolm Perry</b>	2010	<b>None</b>
1993	<b>Norman Hertzner</b>	2011	<b>Germano Melissano</b>
1994	<b>Norman Browse</b>	2012	<b>Roy K. Greenberg</b>
1995	<b>Calvin Ernst</b>		<b>Hazim J. Safi</b>
1996	<b>Anthony Whittemore</b>	2013	<b>Spence M. Taylor</b>
1997	<b>None</b>	2014	<b>Alan B. Lumsden</b>
1998	<b>None</b>	2015	<b>Peter Glociczki</b>
1999	<b>Jonathan Towne</b>	2016	<b>Alik Farber</b>
2000	<b>R. Thomas Grayston</b>		
2001	<b>William Hiatt</b>		
2002	<b>Thomas R. Russell</b>		
2003	<b>None</b>		

## **GENERAL INFORMATION**

### **EDUCATIONAL OBJECTIVES & METHODS**

The 31st 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**

The target audience for this course includes: 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 CLI and Venous focused symposiums. Trainee programs each afternoon feature Mock Oral Examinations and a Practice Options Forum.

### **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 through the joint providership of the American College of Surgeons and the Western Vascular Society. The American College of Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

### AMA PRA CATEGORY 1 CREDITS™

The American College of Surgeons designates this live activity for a maximum of *15 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 13.25 credits meet the requirements for Self-Assessment.



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Accreditation Council for Continuing Medical Education

## INSTRUCTIONS FOR CME CREDIT COLLECTION

To claim the 15 *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 13.5 *AMA PRA Category 1 Credits* for Self- Assessment please visit the registration desk for a QR code for each session to be linked to the online self- assessment quiz and complete the quiz within 10 days of the program.

## **ACKNOWLEDGEMENTS**

The Western Vascular Society wishes to thank the following companies for their educational grants in support of the 31st Annual Meeting.

### **Cook Medical**

The Western Vascular Society wishes to thank the following companies for exhibiting in support of the 31st Annual Meeting.

**Abbott Vascular**

**Bard Peripheral Vascular**

**Bolton Medical**

**Cook Medical**

**Cryolife**

**Endologix, Inc.**

**Getinge Group**

**LeMaitre Vascular**

**Lombard Medical**

**Medtronic**

**Shire**

**Silk Road Medical**

**W.L. Gore & Associates**

# NOTES



# SCHEDULE OF EVENTS

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## SATURDAY, SEPTEMBER 24, 2016

<i>2:00 p.m. - 8:00 p.m.</i>	<b>Registration</b>
<i>1:00 p.m. - 4:00 p.m.</i>	<b>Executive Council Meeting</b>
<i>5:00 p.m. - 6:00 p.m.</i>	<b>ePoster Competition</b>
<i>6:00 p.m. - 7:30 p.m.</i>	<b>Welcome Reception</b>

## SUNDAY, SEPTEMBER 25, 2016

<i>6:00 a.m. - 2:00 p.m.</i>	<b>Registration</b>
<i>7:00 a.m. - 1:00 p.m.</i>	<b>Exhibits Open</b>
<i>7:15 a.m.</i>	<b>Continental Breakfast with Educational Exhibitors</b>
<i>7:45 a.m.</i>	<b>Call to Order and Announcements William Pevec, MD, WVS President</b>
<i>8:00 a.m. - 9:30 a.m.</i>	<b>Scientific Session I</b>
<i>9:30 a.m. - 10:00 a.m.</i>	<b>Coffee Break with Educational Exhibitors</b>
<i>10:00 a.m. - 12:00 p.m.</i>	<b>Scientific Session II</b>
<i>12:00 p.m. - 1:00 p.m.</i>	<b>Women in Surgery Luncheon</b>
<i>12:30 p.m. - 5:00 p.m.</i>	<b>Golf Tournament</b>
<i>1:00 p.m. - 3:30 p.m.</i>	<b>Garden of the Gods Tour</b> <i>Shuttle to Park from Broadmoor Lobby</i>
<i>1:00 p.m. - 3:00 p.m.</i>	<b>Afternoon Symposium: Venous Disease</b>
<i>4:00 p.m. - 5:30 p.m.</i>	<b>Trainee Symposium: Mock Oral Boards</b>
<i>6:00 p.m. - 9:00 p.m.</i>	<b>Western Barbecue, Cheyenne Lodge</b> <i>Shuttle to Cheyenne Lodge from Broadmoor Lobby</i>

## SCHEDULE OF EVENTS continued

### MONDAY, SEPTEMBER 26, 2016

<i>6:00 a.m. - 2:00 p.m.</i>	<b>Registration</b>
<i>7:00 a.m. - 1:00 p.m.</i>	<b>Exhibits Open</b>
<i>7:30 a.m.</i>	<b>Continental Breakfast with Educational Exhibitors</b>
<i>8:00 a.m. - 9:30 a.m.</i>	<b>Scientific Session III</b>
<i>9:30 a.m. - 10:00 a.m.</i>	<b>Coffee Break with Educational Exhibitors</b>
<i>10:00 a.m. - 11:00 a.m.</i>	<b>Scientific Session IV</b>
<i>11:00 a.m. - 11:45 a.m.</i>	<b>Presidential Guest Lecture - Alik Farber, MD</b>
<i>11:50 a.m. - 12:30 p.m.</i>	<b>WVS Business Meeting</b>
<i>1:00 p.m. - 3:00 p.m.</i>	<b>Afternoon Symposium: CLI</b>
<i>1:30 p.m. - 5:00 p.m.</i>	<b>Tennis Tournament</b>
<i>4:00 p.m. - 5:30 p.m.</i>	<b>Trainee Symposium: Open Forum on Partnership and Practice Settings</b>
<i>6:30 p.m. - 7:30 p.m.</i>	<b>Reception</b>
<i>7:30 p.m. - 10:00 p.m.</i>	<b>Banquet and Dance with HomeSlice Band</b>

### TUESDAY, SEPTEMBER 27, 2016

<i>6:00 a.m. - 12:00 p.m.</i>	<b>Registration</b>
<i>7:00 a.m. - 8:00 a.m.</i>	<b>Continental Breakfast with Educational Exhibitors</b>
<i>7:30 a.m. - 8:40 a.m.</i>	<b>Scientific Session V</b>
<i>8:40 a.m. - 9:10 a.m.</i>	<b>Coffee Break with Educational Exhibitors</b>
<i>9:10 a.m. - 11:00 a.m.</i>	<b>Scientific Session VI</b>
<i>11:00 a.m.</i>	<b>“Best Trainee” Competition Announcement 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

### **BEST TRAINEE PRESENTATIONS**

Same as full presentations

### **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**

The audiovisual available will be PowerPoint. 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 Benjamin W. Starnes, WVS Recorder, at [starnes@uw.edu](mailto:starnes@uw.edu).

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

<b>Saturday, September 24</b>	<b>2:00 p.m. - 8:00 p.m.</b>
<b>Sunday, September 25</b>	<b>6:00 a.m. - 2:00 p.m.</b>
<b>Monday, September 26</b>	<b>6:00 a.m. - 2:00 p.m.</b>
<b>Tuesday, September 27</b>	<b>6:00 a.m. - 12:00 p.m.</b>

# NOTES



# SCIENTIFIC PROGRAM

# SCIENTIFIC PROGRAM

SATURDAY, SEPTEMBER 24, 2016

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

**Executive Council Meeting**

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

**ePoster Competition**

See pages 32 - 33 for the list of presentations

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

**Welcome Reception**

## SCIENTIFIC PROGRAM continued

SUNDAY, SEPTEMBER 25, 2016

7:15 a.m.

**Continental Breakfast with Educational Exhibitors**

7:45 a.m.

**William C. Pevec, MD, Western Vascular Society President**

Call to Order and Announcements

Robert Hye Memorial Resident Research Update

8:00 - 9:30 a.m.

### **SCIENTIFIC SESSION I**

Moderators: William C. Pevec, MD and Benjamin W. Starnes, MD

Presentation 1

\*Best Trainee Entry\*

8:00 - 8:20 a.m.

#### **Medical Therapy and Intervention Do Not Improve Uncomplicated Isolated Mesenteric Artery Dissection Outcomes Over Observation Alone**

Author(s): **Jacob Loeffler, MD<sup>1</sup>**, Hideaki Obara, MD<sup>2</sup>, Naoki Fujimura, MD<sup>11</sup>, Paul Bove, MD<sup>3</sup>, Daniel Newton, MD<sup>4</sup>, Sara Zettervall, MD<sup>5</sup>, André van Petersen, MD<sup>6</sup>, Robert H. Geelkerken, MD<sup>13</sup>, Kristofer Charlton-Ouw, MD<sup>7</sup>, Sherene Shalhub, MD<sup>8</sup>, Niten Singh, MD<sup>8</sup>, Arnaud Roussel, MD<sup>10</sup>, Natalia O. Glebova, MD<sup>12</sup>, Michael P. Harlander-Locke, MD<sup>9</sup>, Warren J. Gasper, MD<sup>14</sup>, Peter Lawrence, MD<sup>9</sup>, Misty Humphries, MD<sup>1</sup>

<sup>1</sup>University of California, Davis, <sup>2</sup>Keio University, Japan <sup>3</sup>Beaumont Health System, Royal Oak, Mich. <sup>4</sup>Virginia Commonwealth University, Richmond, <sup>5</sup>Beth Israel Deaconess Medical Center, Boston, Mass. <sup>6</sup>Bernhoven Hospital Uden, Netherlands, <sup>7</sup>University of Texas Health Center, Houston, <sup>8</sup>University of Washington, Seattle <sup>9</sup>University of California, Los Angeles, <sup>10</sup>Hôpital Bichat, Paris, France, <sup>11</sup>Keio University, Tokyo, Japan, <sup>12</sup>University of Colorado Denver, <sup>13</sup>The Medisch Spectrum Twente - Enschede, the Netherlands, <sup>14</sup>University of California, San Francisco

*Discussant: Benjamin Starnes, MD*

## SCIENTIFIC PROGRAM continued

Presentation 2

8:20 - 8:40 a.m.

\*Best-Trainee Entry\*

### **Hemodialysis for Elderly Renal Failure Patients: An Age-based Comparison of Fistula Location, Patency, Maturation and Patient Survival**

Authors: **Jonathan Misskey, MD**, Jason Faulds, MD MSc, Ravi Sidhu, MD MED, Keith Baxter, MD MSc, Joel Gagnon, MD, York Hsiang, MB ChB MHSc.

University of British Columbia, Vancouver

*Discussant: Vincent Rowe, MD*

Presentation 3

8:40 - 9:00 a.m.

### **Angiotensin Receptor Blockers in AAA Management - Evidence Supporting the TEDY Trial**

Authors: **Ronald L. Dalman, MD**, Haojun Xuan, MD, Wei Wang, MD, PhD, Hiroki Tanaka, MD, PhD, Naoki Fujimura, MD, PhD, Baohui Xu, MD, PhD

Stanford University, Calif.

*Discussant: Larry Kraiss, MD*

Presentation 4

\*Best Trainee Entry\*

9:00 - 9:20 a.m.

### **The Modified Allen's Test is Not a Useful Tool for Assessing Palmar Arch Patency**

Authors: **Xuan-Binh D. Pham, MD<sup>1</sup>**, Luke Okamuro<sup>1</sup>, Ezinne J. Ihenachor, BS<sup>2</sup>, Jerry J. Kim, MD<sup>1</sup>, Hamid Alipour<sup>1</sup>, MD, Matthew Koopmann, MD<sup>1</sup>, Tim J. Ryan, MD<sup>1</sup>, Christian M. de Virgilio, MD<sup>1</sup>

<sup>1</sup>Harbor-UCLA Medical Center, Torrance, <sup>2</sup>David Geffen School of Medicine at University of California, Los Angeles

*Discussant: Sherene Shalhub, MD*

## SCIENTIFIC PROGRAM continued

Presentation 5

9:20 - 9:30 a.m.

### **Early Access of Bovine Carotid Artery Graft Can Eliminate the Use of Tunneled Hemodialysis Catheters**

Author(s): **Sherwin Abdoli**, Anuj Mahajan, MD, Sukgu Han, MD, Christian Ochoa, MD

University of Southern California, Los Angeles

9:30 - 10:00 a.m.

### **Coffee Break With Educational Exhibitors**

10:00 a.m. - 12:00 p.m.

## **SCIENTIFIC SESSION II**

Moderators: William C. Pevec, MD and Mark R. Sarfati, MD

Presentation 6

10:00 - 10:20 a.m.

### **Bifurcated-Bifurcated Aneurysm Repair: A Novel Technique to Repair Infrarenal Aortic Aneurysms in the Setting of Iliac Aneurysms**

Author: **Susanna Shin, MD**, Benjamin Starnes, MD

University of Washington, Seattle

*Discussant: William Quinones-Baldrich, MD*

Presentation 7

10:20 - 10:40 a.m.

\*Best-Trainee Entry\*

### **Preoperative Hypoalbuminemia is Associated with Poor Clinical Outcomes after Open and Endovascular Abdominal Aortic Aneurysm Repair**

Author: **Elica Inagaki, MD<sup>1</sup>**, Alik Farber, MD<sup>1</sup>, Mohammad H. Eslami, MD MPH<sup>1</sup>, Jeffrey Kalish, MD<sup>1</sup>, Matthew R. Peacock, BS<sup>2</sup>, Denis V. Rybin, PhD<sup>2</sup>, Gheorghe Doros, PhD<sup>2</sup>, Jeffrey J. Siracuse, MD<sup>1</sup>

<sup>1</sup>Boston Medical Center, Mass. <sup>2</sup>Boston University School of Medicine, Mass.

*Discussant: Jason Lee, MD*

## SCIENTIFIC PROGRAM continued

Presentation 8

10:40 - 11:00 a.m.

\*Best-Trainee Entry\*

### **Morbidity of Endovascular Abdominal Aortic Aneurysm Repair Is Directly Influenced by Size but Remains Less Than Open Repair**

Authors: **Douglas M. Overbey, MD**, Brandon C. Chapman, MD, Patrick W. Hosokawa, MS, John C. Eun, MD, Mark R. Nehler, MD

University of Colorado, Aurora

*Discussant: Misty Humphries, MD*

Presentation 9

11:00 - 11:10 a.m.

### **The Role of Endovascular Therapy in Contemporary Management of Mycotic Aortic Aneurysms and Associated Aortoerodigestive Fistulas**

Authors: **Ramsey S. Elsayed, MD**, Sung W. Ham, MD, Miguel F. Manzur, MD, Sukgu M. Han, MD, Wesley K. Lew, MD, Vincent L. Rowe, MD, Fred A. Weaver, MD

Keck Medical Center of USC, Los Angeles, California

Presentation 10

11:10 - 11:20 a.m.

### **Management of Symptomatic Unruptured Aortic Aneurysms Over the Past 20 years**

Authors: **Karen Trang, MD**, E. John Harris, MD, Ronald L. Dalman, MD, Jason T. Lee, MD, Matthew W. Mell, MD, Venita Chandra, MD

Stanford University, California

Presentation 11

11:20 - 11:40 a.m.

\*Best-Trainee Entry\*

### **Intraluminal Thrombus is Associated with Aortic Wall Weakening in Small Ruptured Abdominal Aortic Aneurysms**

Authors: **Jeffrey D. Crawford, MD**, Stephen J. Haller, B.S., Gregory J. Landry, MD, Cherrie Abraham, MD, Gregory L. Moneta, MD, Sandra Rugonyi, PhD, Amir F. Azarbal, MD

Oregon Health and Sciences University, Portland

*Discussant: Wei Zhou, MD*

## SCIENTIFIC PROGRAM continued

Presentation 12

*11:40 - 11:50 a.m.*

### **Does the Outcome of Type II Endoleaks after EVAR Justify Conservative Management?**

Authors: **Mark Ajalat**, Russell Williams, MD, Samuel E. Wilson, MD

Long Beach VA Medical Center, California

Presentation 13

*11:50 a.m. - 12:00 p.m.*

### **Fifty-Liter Blood Loss Without a Single Blood Transfusion: Report of Rapid Re-circulation of Unprocessed Blood in Emergency Thoracic Aortic Surgery**

Authors: **Jason Faulds, MD<sup>1</sup>**, Anthony Estrera, MD<sup>2</sup>, Hazim Safi, MD<sup>2</sup>

<sup>1</sup>Vascular Surgery, University of British Columbia, Vancouver,

<sup>2</sup>University of Texas, Houston

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

### **Women In Surgery Luncheon**

*12:30 - 5:00 p.m.*

### **Golf Tournament**

*1:00 - 3:00 p.m.*

### **Afternoon Symposium: Venous Disease** - Wei Zhou, MD

See pages 34 - 35 for the list of presentations

*4:00 - 5:30 p.m.*

### **Trainee Symposium** - Susanna H. Shin, MD

Mock Orals Boards

*6:00 - 9:00 p.m.*

### **Western Barbeque** - Cheyanne Lodge

Shuttles leaves from Broadmoor Lobby at 6:00 p.m.

## SCIENTIFIC PROGRAM continued

MONDAY, SEPTEMBER 26, 2016

7:30 a.m.

**Continental Breakfast with Educational Exhibitors**

8:00 - 9:30 a.m.

### SCIENTIFIC SESSION III

Moderators: William C. Pevec, MD and York N. Hsiang, MB, MHS

Presentation 14

8:00 - 8:20 a.m.

\*Best-Trainee Entry\*

#### **Lower Extremity CT Angiography Can Predict Technical Success of Endovascular Revascularization in the Superficial Femoral and Popliteal Arteries**

Authors: **Nathan K. Itoga, MD**, Tanner Kim, MD, Anna M. Sailer, MD, Dominik Fleischmann, MD, Matthew W. Mell, MD, MS

Stanford University Medical Center, California

*Discussant: Brian DeRubertis, MD*

Presentation 15

8:20 - 8:30 a.m.

#### **National Comparison of Hybrid and Open Repair for Aorto-Iliac-Femoral Occlusive Disease**

Authors: **Matthew Mell, MD, MS**, Elsie Gyang Ross, MD, Marco Zavatta, MD

Stanford University, Calif.

Presentation 16

8:30 - 8:40 a.m.

#### **Isolated Iliac Vascular Injuries - Morbidity of Repair vs Ligation of Iliac Vein Injury**

Authors: **Gregory A. Magee, MD, MS<sup>1,2</sup>**, Jayun Cho, MD<sup>2</sup>, Elizabeth Benjamin, MD, PhD<sup>2</sup>, Kazuhide Matsushima, MD<sup>2</sup>, Aaron Strumwasser, MD<sup>2</sup>, Kenji Inaba, MD<sup>2</sup>, Omid Jazaeri, MD<sup>1</sup>, Charles Fox, MD<sup>1</sup>, Demetrios Demetriades, MD, PhD<sup>2</sup>

<sup>1</sup>University of Colorado, Aurora, <sup>2</sup>University of Southern California, Los Angeles

## SCIENTIFIC PROGRAM continued

Presentation 17

8:40 - 8:50 a.m.

### **Decreased Apoptosis and Increased Pro-Angiogenic Gene Expression in P27Kip1 Deficient Mouse Collaterals After Hindlimb Ischemia**

Authors: **Galit Ankri- Eliahoo, PhD**, Frank Dastvan, BS,  
Gale L. Tang, MD

University of Washington, Seattle

Presentation 18

\*Best-Trainee Entry\*

8:50 - 9:10 a.m.

### **The Impact of Statin Therapy on the Primary Patency of Femoral and Popliteal Artery Stents**

Authors: **Derek de Grijis, MD<sup>1</sup>**, Pedro Teixeira, MD<sup>2</sup>,  
Steven G. Katz, MD<sup>3</sup>

<sup>1</sup>Department of Surgery, Huntington Memorial Hospital, Pasadena, Calif., <sup>2</sup>Department of Surgery and Perioperative Care, University of Texas at Austin Dell Medical School, <sup>3</sup>Division of Vascular Surgery and Endovascular Surgery, Keck School of Medicine, University of Southern California, Los Angeles

*Discussant: Thomas Rehring, MD*

Presentation 19

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

### **Cryopreserved Saphenous Vein: Last Ditch Conduit for Limb Salvage?**

Authors: **Leigh Ann O'Banion, MD**, Bian Wu, MD,  
Charles M. Eichler, MD, Linda M. Reilly, MD, Michael S. Conte, MD,  
Jade S. Hiramoto, MD

University of California, San Francisco

*Discussant: Greg Moneta, MD*

9:30 - 10:00 a.m.

### **Coffee Break with Educational Exhibitors**

## SCIENTIFIC PROGRAM continued

10:00 - 11:00 a.m.

### SCIENTIFIC SESSION IV

Moderators: Steven Katz, MD and Wei Zhou, MD

Presentation 20

10:00 - 10:20 a.m.

\*Best-Trainee Entry\*

#### **Outcomes of Open and Endovascular Lower Extremity Revascularization in Current Smokers with Intermittent Claudication and Critical Limb Ischemia**

Authors: **Samuel L. Chen, MD**, Matthew D. Whealon, MD, Nii-Kabu Kabutey, MD, Isabella J. Kuo, MD, Michael D. Sgroi, MD, Roy M. Fujitani, MD

University of California, Irvine Medical Center

*Discussant: Niten Singh, MD*

Presentation 21

10:20 - 10:30 a.m.

#### **A VQI-Based Frailty Instrument Predicts 9-Month Postoperative Mortality**

Authors: **Larry W. Kraiss, MD<sup>1</sup>**, Ragheed Al-Dulaimi, MD<sup>1</sup>, Angela P. Presson, PhD<sup>1</sup>, Shipra Arya, MD SM<sup>2</sup>, George K. Lee, MD<sup>3</sup>, Philip P. Goodney, MD MS<sup>4</sup>, Matthew Mell, MD<sup>3</sup>, Jason Johanning, MD MS<sup>5</sup>, Julie L. Beckstrom, RN MSN CCRC<sup>1</sup>, Benjamin S. Brooke, MD PhD<sup>1</sup>

<sup>1</sup>University of Utah, Salt Lake City, <sup>2</sup>Emory University, Atlanta, Ga.

<sup>3</sup>Stanford University, Calif., <sup>4</sup>Dartmouth Medical School, Lebanon, N.H. <sup>5</sup>University of Nebraska, Omaha

Presentation 22

10:30 - 10:40 a.m.

#### **Operative Results of Iliac Artery Endofibrosis in High-Performance Athletes**

Authors: **Tiffany Wu, MD**, Corenelius Olcott, IV, MD, Jason T. Lee, MD

Stanford University, California

## SCIENTIFIC PROGRAM continued

Presentation 23

*10:40 - 11:00 a.m.*

### **Endovascular versus Open Bypass Surgery for TASC D Femoropopliteal Lesions in Patients with Critical Limb Ischemia**

Authors: **Jason T. Nieves, MD**, Gagan Singh, MD, John Laird, MD, William Pevec, MD, Misty Humphries, MD

UC Davis Medical Center, Sacramento, Calif.

*Discussant: John Lane, MD*

*11:00 - 11:45 a.m.*

### **Presidential Guest Lecture**

Alik Farber, MD

*11:50 - 12:30 p.m.*

### **Western Vascular Society Business Meeting**

*Members Only*

*1:00 - 3:00 p.m.*

### **Afternoon Symposium: Critical Limb Ischemia (CLI)**

See pages 36 - 37 for the list of presentations

*1:30 - 5:00 p.m.*

### **Tennis Tournament**

*4:00 - 5:30 p.m.*

### **Trainee Symposium:**

#### **Open Forum on Partnership and Practice Settings**

#### **“Life After Training and Practice Options”**

Panel Members: Ty Garland, MD, Omid Jazaeri, MD, Mark Nehler, MD, Thomas Rehring, MD

*6:30 - 10:00 p.m.*

### **Reception, Banquet, and Dance**

*Reception in Pompeian Room*

*Banquet and Dance in Main Ballroom*

## SCIENTIFIC PROGRAM continued

TUESDAY, SEPTEMBER 27, 2016

7:00 a.m.

**Continental Breakfast with Educational Exhibitors**

7:30 - 8:40 a.m.

### SCIENTIFIC SESSION V

Moderators: Steven Katz, MD and Christopher D. Owens, MD

Presentation 24

7:30 - 7:50 a.m.

#### **Endovascular Repair of Extent II-IV Thoracoabdominal Aortic Aneurysms**

Authors: **Jason Faulds, MD**, Jon Misskey, MD, Joel Gagnon, MD, Keith Baxter, MD, Jerry Chen, MD, Darren Klass, MD, Joel Price, MD, Michael Janusz, MD

University of British Columbia, Vancouver

*Discussant: Matthew Sweet, MD*

Presentation 25

7:50 - 8:00 a.m.

#### **Usefulness of Four-Dimensional Flow Cardiac Magnetic Resonance for Evaluation of Aortic Dissection**

Authors: **Gregory Magee, MD<sup>1</sup>**, Michal Schaefer, MS<sup>2</sup>, Ross Volpe, MS<sup>2</sup>, Adam Rocker, MS<sup>2</sup>, Ryan Arce, MS<sup>2</sup>, Kendall S. Hunter, PhD<sup>2</sup>, Omid Jazaeri, MD<sup>2</sup>

<sup>1</sup>University of Colorado, School of Medicine, Aurora, <sup>2</sup>University of Colorado, College of Engineering, Dept. of Bioengineering, Aurora

## SCIENTIFIC PROGRAM continued

Presentation 26

8:00 - 8:20 a.m.

### **Differences in Aortic Diameter Measurements with Intravascular Ultrasound and Computed Tomography after Blunt Traumatic Aortic Injury**

Authors: **Maria Ceja Rodriguez, BA**, Augustus Realyvasquez, MD, Joseph Galante, MD, William Pevec, MD, Misty Humphries, MD

University of California, Davis

*Discussant: Carlos Donayre, MD*

Presentation 27

8:20 - 8:30 a.m.

### **Endovascular Repair of Blunt Thoracic Aortic Injuries with the Zenith Alpha Thoracic Device: Updated Outcomes from the TRANSFIX Study**

Authors: **Benjamin W. Starnes, MD<sup>1</sup>**, Amit Dwivedi, MD<sup>2</sup>, Joseph Giglia, MD<sup>3</sup>, Karen Woo, MD<sup>4</sup>, Chyon Yeh, PhD<sup>5</sup>

<sup>1</sup>University of Washington, Wa. <sup>2</sup>University of Louisville, Ky. <sup>3</sup>University of Cincinnati, Ohio, <sup>4</sup>University of Southern California, Los Angeles, <sup>5</sup>COOK Research Incorporated, Lafayette, Ind.

Presentation 28

8:30 - 8:40 a.m.

### **Standard TEVAR Compared to PETTICOAT in Aortic Dissection**

Authors: **Kyle Arsenault, MD**, Darren Klass, MD, Joel Price, MD, Michael Janusz, MD, Joel Gagnon, MD, Jerry Chen, MD, Jason Faulds, MD

University of British Columbia, Vancouver

8:40- 9:10 a.m.

### **Coffee Break with Educational Exhibitors**

## SCIENTIFIC PROGRAM continued

9:10 - 11:00 a.m.

### SCIENTIFIC SESSION VI

Moderators: Steven Katz, MD and Niten Singh, MD

Presentation 29

9:10 - 9:30 a.m.

\*Best-Trainee Entry\*

#### **Female Gender is Not a Predictor for Worse Outcomes Following Carotid Interventions in the Community: A Report from Washington State's Vascular Interventional Surgical Care and Outcomes Assessment Program (VI-SCOAP)**

Authors: **Daiva Nevidomskyte, MD**, Susanna Shin, MD, Gale Tang, MD, Thomas Hatsukami, MD, Felix Vladimirov, MD, David R. Flum, MD, Mark H. Meissner, Sherene Shalhub, MD MPH

University of Washington, Seattle

*Discussant: Ahmed Abou-Zamzam, MD*

Presentation 30

9:30 - 9:40 a.m.

#### **Optimizing Management for Mycotic Carotid Artery Blowouts in the Irradiated Neck**

Authors: **Samuel L. Chen, MD**, Isabella J. Kuo, MD, Nii-Kabu Kabutey, MD, Roy M. Fujitani, MD

University of California, Irvine Medical Center

Presentation 31

9:40 - 10:00 a.m.

\*Best-Trainee Entry\*

#### **VCAM-1 is a Promising Target to Identify High-risk Carotid Plaques using Contrast-enhanced Duplex Ultrasound**

Authors: **Craig C. Weinkauff, MD, PhD<sup>1</sup>**, Scott S. Berman, MD, MHA<sup>2</sup>, Kay Goshima, MD<sup>1</sup>, Luis R. Leon, MD<sup>3</sup>, Edmund R. Marinelli, PhD<sup>4</sup>, Rebecca Millius, MD<sup>1</sup>, Evan C. Unger, MD<sup>4</sup>

<sup>1</sup>University of Arizona, Tucson <sup>2</sup>Carondelet Heart and Vascular Institute Physicians, <sup>3</sup>Tucson Medical Center, <sup>4</sup>NuvOx Pharmaceuticals

*Discussant: Nam Tran, MD*

## SCIENTIFIC PROGRAM continued

Presentation 32

10:00 - 10:20 a.m.

\*Best-Trainee Entry\*

### **Contemporary Outcomes of Elective Iliac Vein Stenting in Chronic Venous Occlusive Disease**

Authors: **Johnathon C. Rollo, MD**, Steven Farley, MD, Adam Oskowitz, MD, Warren Chow, MD, Juan Carlos Jimenez, MD, Brian Derubertis, MD

University of California, Los Angeles

*Discussant: William Lee, MD*

Presentation 33

10:20 - 10:40 a.m.

### **Vascular Surgery: An Essential Hospital Resource in Modern Healthcare**

Authors: **Miguel F. Manzur, MD**, Sung W. Ham, MD, Ramsey S. Elsayed, MD, Trevor Simcox, BS<sup>2</sup>, Fred A. Weaver, MD, MMM

Keck School of Medicine of USC, Los Angeles, California

*Discussant: Gregory Landry, MD*

Presentation 34

10:40 - 11:00 a.m.

### **Determinants of Mid-term Functional Outcomes and Wound Healing in a Hospital-Based Limb Preservation Program**

Authors: **Bala Ramanan, MD**, Ayman Ahmed, MBBS, Bian Wu, MD, Marlin W. Causey, MD, Warren J. Gasper, MD, Shant M. Vartanian, MD, Jade S. Hiramoto, MD, Michael S. Conte, MD

Vascular Surgery, University of California, San Francisco

*Discussant: David Rigberg, MD*

11:00 a.m.

### **“Best Trainee” Competition Announcement**

11:30 a.m.

### **Meeting Adjourns**

## POSTER COMPETITION

SATURDAY, SEPTEMBER 25, 2016

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

### **ePOSTER COMPETITION**

Moderator: Niten Singh, MD

Presentation 1

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

### **Readmission after Open Abdominal Aortic Aneurysm Repair: Consider Prioritizing Triage to Teaching Hospitals**

Madhukar S. Patel, MD

Presentation 2

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

### **Gender Differences in Arteriovenous Fistula Surgical Site Selection and Maturation Time**

Timothy Y. Liu, MD

Presentation 3

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

### **Strokes Rates with TransCarotid Artery Revascularization with High-Rate Flow Reversal Embolic Protection are Comparable with Standard Risk Carotid Endarterectomy**

Mazin I. Foteh, MD

Presentation 4

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

### **Smoking Habits of Patients Undergoing Treatment for Intermittent Claudication in the Vascular Quality Initiative**

Joshua Gabel, MD

Presentation 5

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

### **Epidural Analgesia Is Less Effective for VA Patients than Community Practice Patients After Open Aortic Surgery**

Anna H. Ohlsson, MD

## POSTER COMPETITION continued

Presentation 6

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

**Predictors of Poor Outcomes in Type B Aortic Dissection Repair**

Robert J. Beaulieu, MD

Presentation 7

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

**Infection Is Driving Factor in Progression of Forefoot  
Diabetic Ulcers to Major Lower Extremity Amputation**

Tana Repella, MD

Presentation 8

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

**Factors Predicting Successful Limb Salvage After  
Extremity Vascular Injury**

Shahram Aarabi, MD, MPH

*5:50 - 6:00 p.m.*

**Discussion and Winner Announced**

## AFTERNOON SYMPOSIUM

SUNDAY, SEPTEMBER 26, 2016

*1:00 - 3:00 p.m.*

### **VENOUS DISEASE**

Moderator: Wei Zhou, MD

Presentation 1

*1:00 - 1:10 p.m.*

#### **How to Set Up a Successful Outpatient Venous Center**

Ruth Bush, MD

Presentation 2

*1:10 - 1:20 p.m.*

#### **Updates on Superficial Venous Disease and Beyond**

Oliver Aalami, MD

Presentation 3

*1:20 - 1:30 p.m.*

#### **Perforators - When, How, and Why Treating Perforators**

David Rigberg, MD

Presentation 4

*1:30 - 1:40 p.m.*

#### **Algorithm for Treating Chronic Venous Occlusion**

Polly Kokinos, MD

Presentation 5

*1:40 - 1:50 p.m.*

#### **New Era in Anticoagulant Management**

Omid Jazaeri, MD

Presentation 6

*1:50 - 2:00 p.m.*

#### **Venous Wound Care from A-Z**

Robert McLafferty, MD

## AFTERNOON SYMPOSIUM continued

Presentation 7

*2:00 - 2:10 p.m.*

### **Whether and When to Treat Chronic Axillary/ Subclavian Vein Occlusion in Patients With TOS**

Julie Freischlag, MD

Presentation 8

*2:10 - 2:20 p.m.*

### **What is Pelvic Congestive Syndrome and Treatment Options**

Anthony Venbrux, MD

Presentation 9

*2:20 - 2:30 p.m.*

### **Management of Lymphatic Disorder and Potential Surgical Options**

Marlys H. Witte, MD

*2:30 - 3:00 p.m.*

### **Discussion**

## AFTERNOON SYMPOSIUM

MONDAY, SEPTEMBER 25, 2016

*1:00 - 3:00 p.m.*

### **CRITICAL LIMB ISCHEMIA(CLI)**

Moderators: Niten Singh, MD and Brian DeRubertis, MD

Presentation 1

*1:00 - 1:10 p.m.*

#### **Addressing Non-operative CLI Patients: What is the Optimal Medical Management of These Patients?**

Susanna Shin, MD

Presentation 2

*1:10 - 1:20 p.m.*

#### **Identifying and Optimal Non-invasive Work-up of Patients with CLI?**

David Dawson, MD

Presentation 3

*1:20 - 1:30 p.m.*

#### **Endovascular Innovations: Is Adventitial Based Therapy Going to Prevent Restenosis?**

Christopher Owens, MD

Presentation 4

*1:30 - 1:40 p.m.*

#### **Drug-Coated Balloons: What Are the Results and Will This Eventually be Standard of Care?**

Niten Singh, MD

Presentation 5

*1:40 - 1:50 p.m.*

#### **Innovations in Open Surgical Bypass: Have there Been Any in the Last 10 Years and What Is Coming Down the Pipeline?**

Vincent Rowe, MD

## AFTERNOON SYMPOSIUM continued

Presentation 6

*1:50 - 2:00 p.m.*

**Vein Graft Stenosis: What Have We Learned?**

Michael Conte, MD

Presentation 7

*2:00 - 2:10 p.m.*

**Techniques - Pedal Access: Can it Be Performed in Patients with Diseased Tibial Arteries?**

Brian DeRubertis, MD

Presentation 8

*2:10 - 2:20 p.m.*

**In Situations Where No Endovascular or Open Options Exist, Can Stem Cell Therapy Be Beneficial?**

York Hsiang, MB, MHSc

Presentation 9

*2:20 - 2:30 p.m.*

**After a Career in Limb Salvage: Is the Future Bright?**

Charles Andersen, MD

Presentation 10

*2:30 - 2:40 p.m.*

**BEST-CLI trial: What Are We Expecting to See and How Is the Trial Faring thus Far?**

Alik Farber, MD

*2:40 - 3:00 p.m.*

**Discussion**

# NOTES

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# SCIENTIFIC SESSION ABSTRACTS

## SCIENTIFIC SESSION ABSTRACTS

Presentation 1

### **Medical Therapy and Intervention Do Not Improve Uncomplicated Isolated Mesenteric Artery Dissection Outcomes Over Observation Alone**

Author(s): Jacob Loeffler<sup>1</sup>, Hideaki Obara, MD<sup>2</sup>, Naoki Fujimura, MD<sup>11</sup>, Paul Bove, MD<sup>3</sup>, Daniel Newton, MD<sup>4</sup>, Sara Zettervall, MD<sup>5</sup>, André van Petersen, MD<sup>6</sup>, Robert H. Geelkerken, MD<sup>13</sup>, Kristofer Charlton-Ouw, MD<sup>7</sup>, Sherene Shalhub, MD<sup>8</sup>, Niten Singh, MD<sup>8</sup>, Arnaud Roussel, MD<sup>10</sup>, Natalia O. Glebova, MD<sup>12</sup>, Michael P. Harlander-Locke, MD<sup>9</sup>, Warren J. Gasper, MD<sup>14</sup>, Peter Lawrence, MD<sup>9</sup>, Misty Humphries, MD<sup>1</sup>

Institution(s): <sup>1</sup>University of California, Davis, <sup>2</sup>Keio University, Japan <sup>3</sup>Beaumont Health System, Royal Oak, Mich. <sup>4</sup>Virginia Commonwealth University, Richmond, <sup>5</sup>Beth Israel Deaconess Medical Center, Boston, Mass. <sup>6</sup>Bernhoven Hospital Uden, Netherlands, <sup>7</sup>University of Texas Health Center, Houston, <sup>8</sup>University of Washington, Seattle <sup>9</sup>University of California, Los Angeles, <sup>10</sup>Hôpital Bichat, Paris, France, <sup>11</sup> Keio University, Tokyo, Japan, <sup>12</sup>University of Colorado Denver, <sup>13</sup>The Medisch Spectrum Twente - Enschede, the Netherlands, <sup>14</sup>University of California, San Francisco

**OBJECTIVE:** Isolated dissection of the mesenteric vessels is rare but increasingly recognized. This study aimed to evaluate patient characteristics, treatment patterns, and outcomes of mesenteric dissection using multi-institutional data.

**METHODS:** All patients at participant hospitals between January 2003 and December 2015 with dissection of the celiac artery (or its branches) and/or dissection of the superior mesenteric artery (SMA) were included. Patients with an aortic dissection were excluded. Demographic, treatment, and follow up data were collected. The primary outcomes included late vessel thrombosis (LVT) and aneurysmal degeneration.

**RESULTS:** Twelve institutions identified 229 patients (220 with complete treatment records) with a mean age of 55 ±12.5 years. Median time to last follow up was 15 months (IQR = 3.8–32). Most patients were men (82% vs. 18% women) and symptomatic at presentation (162 vs. 65 asymptomatic). Isolated SMA dissection was more common than celiac artery dissection (n=146

## SCIENTIFIC SESSION ABSTRACTS continued

and 70, respectively). Concomitant dissection of both arteries was rare (n=13). Primary treatment was medical in 146 patients with oral anticoagulation or antiplatelet therapy (n=76 and 70, respectively), while 55 patients were observed. 6 patients developed LVT and 22 patients aneurysmal degeneration (2.7% and 10%, respectively). For symptomatic patients without evidence of ischemia (n=134), there was no difference in rate of LVT with medical therapy compared to observation alone (5 vs. 0, p=0.35). No asymptomatic patient (n=64) had an episode of LVT at five years. Aneurysmal degeneration rates were 7.8% overall, but did not differ among patients treated with medical therapy or observation alone (p=0.82). Surgical or endovascular intervention was performed in 18 patients (3 ischemia, 13 pain, 1 aneurysmal degeneration, 1 asymptomatic). Excluding the patients treated for ischemia, there was no difference in LVT between patients treated by intervention and those treated medically (1 vs. 5, p=0.57).

**CONCLUSIONS:** Isolated mesenteric dissection has a relatively benign course for most patients. Use of medical therapy did not improve outcomes over observation alone. Long-term follow up is recommended since occasional patients develop aneurysmal degeneration or ischemia that may require repair.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 2

### **Hemodialysis for Elderly Renal Failure Patients: An Age-based Comparison of Fistula Location, Patency, Maturation and Patient Survival**

Author(s): Jonathan Misskey, MD, Jason Faulds, MD MSc, Ravi Sidhu, MD MEd, Keith Baxter, MD MSc, Joel Gagnon, MD, York Hsiang, MB ChB MHSc.

Institution(s): University of British Columbia, Vancouver

**OBJECTIVE:** In many centers elderly patients (>65 years) comprise a significant proportion of hemodialysis patients. We compared patency, maturation rates, survival and complications between several age cohorts (<65, 65-79, and >80) to determine if current access protocols should be modified to account for age.

**METHODS:** Data were retrospectively analyzed from a prospectively maintained database. All patients at 2 teaching hospitals undergoing a first ipsilateral autogenous arteriovenous fistula creation between 2007 and 2013 were considered eligible for inclusion.

**RESULTS:** A total of 941 patients had a first arteriovenous fistula placed during the study period (Mean followup 26.0±19.8 months; range 0-89 months). Of this cohort, 152 (15.3%) fistulas were in patients 80 or older, 397 were aged 65-79 (42.2%), and 392 (41.8%) were < 65. Primary patencies between patients >80, 65-79 and <65 were 40±4%, 38±3 and 51±3% at 12 months, and 12±5%, 13±3% and 27±23% at 36 months (P<0.001). Primary assisted patencies were 72±4, 70±2, and 78±2 at 12 months, and 52±5, 52±3 and 67±3 at 36 months (P<0.001). Secondary patencies were 72±4%, 71±2% and 79±2% at 12 months, and 54±5, 55±3 and 72±3 at 36 months (P<0.001). There was no difference in proximal fistula maturation between groups (24.7%, 30.4% and 21.8%; P=0.118), however distal fistulas had a higher rate of non-maturation in those >80 and 65-79 vs. patients <65 years of age (47.3%, 38.8%, and 28.7%; P=0.020). Mean survival was lowest among those >80 (39.4±3.1 months), followed by those 65-79 (44.3±1.6 months) and <65 (60.9±1.9 months) (P<0.001). Coronary artery disease (HR 1.31; 95% CI 1.01-1.70; P=0.042), female sex (HR 1.57; 95% CI 1.24-1.98; P<0.001), previous ipsilateral catheter (HR 1.62; 95% CI 1.12 -2.35; P = 0.011), previous bilateral catheters (HR 1.95;

## SCIENTIFIC SESSION ABSTRACTS continued

95% CI 1.26-3.00;  $P=0.003$ ) and distal fistulas (HR 1.61; 95% CI 1.28-2.02;  $P<0.001$ ) were all associated with loss of AVF secondary patency.

**CONCLUSIONS:** Patients  $<65$  demonstrated superior patency rates for all access configurations compared to older cohorts, with the effect greatest for distal accesses. These findings suggest that an approach that favors access patency over the most distal configuration in cohorts with significantly shortened life expectancy may be associated with increased autogenous access use.

Presentation 3

### **Angiotensin Receptor Blockers in AAA Management: Evidence Supporting the TEDY Trial**

Author(s): Ronald L. Dalman, MD, Haojun Xuan, MD, Wei Wang, MD, PhD, Hiroki Tanaka, MD, PhD, Naoki Fujimura, MD, PhD, Baohui Xu, MD, PhD

Institution(s): Stanford University, Calif.

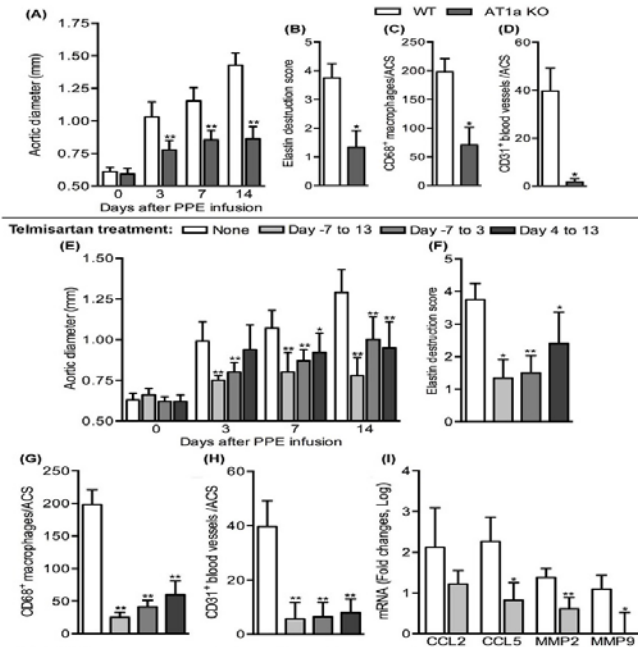
**Objective:** The Telmisartan in the Management of Abdominal Aortic Aneurysm (TEDY) trial (trial identifier: NCT01683084) is multinational, prospective, randomized, placebo-controlled clinical trial testing the efficacy of the angiotensin receptor blocker telmisartan in suppressing early abdominal aortic aneurysm (AAA) disease. Data justifying TEDY was generated in part in experimental murine modeling systems requiring exogenous angiotensin II administration for aneurysm formation. We used AT1a receptor knockout (KO) mice, as well as wild type (WT) mice treated with telmisartan, to examine the consequences of AT1 inhibition in AAAs created without exogenous angiotensin II supplementation.

**METHODS:** Aneurysms were created in male WT or AT1a KO mice via transient intra-aortic porcine pancreatic elastase (PPE) infusion. WT mice were fed telmisartan (10 mg/kg/day) chow or standard chow as control, at intervals indicated in the Figure E-I. AAA progression was assessed in vivo via serial transcutaneous aortic ultrasound imaging, and by histopathology and real-time RT-PCR analysis of aortic tissue at sacrifice.

**RESULTS:** Aortic medial elastic lamellae and smooth muscle cellularity were preserved in AT1a knockout (KO) and telmisartan-treated WT mice following PPE infusion, with marked attenuation of mural angiogenesis and leukocyte infiltration (Figure A-H). Treatment with telmisartan also reduced message for CCL5, MMP-2 and MMP-9 in aneurysmal aortae (Figure I) without influencing expression of PPAR $\gamma$ -regulated genes, and co-administration of a PPAR $\gamma$  antagonist failed to “rescue” the aneurysm phenotype (data not shown). Neither effector T cell differentiation, nor regulatory T cell cellularity, were affected by telmisartan treatment status in WT mice (data not shown). Efficacy was evident regardless of whether treatment was started before or after AAA creation (Figure E - H).

# SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Telmisartan effectively suppresses experimental AAAs, even in modeling systems not incorporating exogenous angiotensin II administration, and inhibition appears dependent on AT1a receptor blockade. Telmisartan limits progression of existing AAAs, a key requirement for clinical translation. These data further support clinical trials evaluating AT1a inhibition in the suppression of early AAA disease.



AT1 inhibition suppresses the formation and progression of experimental AAAs in an exogenous angiotensin II-independent mouse model. A-D: AT1a deficiency attenuated PPE infusion-induced aortic enlargement (A), medial elastin degradation (EVG stain, B), mural CD68<sup>+</sup> macrophage accumulation (C) and CD31<sup>+</sup> neovascularization (D). n=5 mice per group. E-H: Intervention with either telmisartan treatment regimens suppressed aneurysm progression (E), medial elastin degradation (F), mural CD68<sup>+</sup> macrophage density (G) and neovascularization (H). n=10-15 mice per group following PPE infusion. I: Telmisartan treatment beginning 7 days prior to, and ending 13 days following, PPE infusion down regulated the aortic mRNA levels of CCL2, MMP2 and MMP9. n=5 mice in each group. Statistical analysis: one-way ANOVA (A, E) or non-parametric Mann-Whitney test (B-D, F-I), \*P<0.05 and \*\*P<0.01 compared to Wf mice (A-D) or no telmisartan treatment group (none) (E-I).

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 4

### **The Modified Allen's Test is Not a Useful Tool for Assessing Palmar Arch Patency**

Author(s): Xuan-Binh D. Pham, MD<sup>1</sup>, Luke Okamuro<sup>1</sup>,  
Ezinne J. Ihenachor, B.S.<sup>2</sup>, Jerry J. Kim, MD<sup>1</sup>, Hamid Alipour<sup>1</sup>,  
Matthew Koopmann, MD<sup>1</sup>, Tim J. Ryan, MD<sup>1</sup>,  
Christian M. de Virgilio, MD, F.A.C.S.<sup>1</sup>

Institution(s): <sup>1</sup>Harbor-UCLA Medical Center, Torrance, <sup>2</sup>David Geffen School of Medicine at University of California, Los Angeles

**OBJECTIVES:** The Modified Allen's Test (MAT) is an accepted but controversial way to evaluate palmar arch patency. There is a current lack of consensus in the literature regarding the reliability of the MAT. We hypothesize that the MAT is an inaccurate tool in determining the patency of a patient's palmar arch.

**METHODS:** We completed a prospective study at a single university-affiliated institution. All patients presenting to the operating room or to the Vascular Surgery Clinic for an arterio-venous fistula were enrolled beginning in June of 2015. For each patient, a surgical resident in their third year of training or higher performed a physical examination including a MAT on both upper extremities. In-clinic palmar arch duplex ultrasonography (US) was then performed by RPVI-certified vascular surgeons that were blinded to the results of the MAT. Univariate analysis was performed to evaluate the utility of the MAT.

**RESULTS:** There were 32 patients enrolled and 59 arms evaluated. 5 arms were excluded due to indeterminate US findings or patient factors that limited an adequate physical exam. The MAT was positive for an incomplete arch in 14 (24%) arms while US instead identified 23 (39%) incomplete arches. Of all 59 exams performed there were 5 (8.4%) false positives and 14 (24%) false negatives resulting in 19 (32%) discordant exams ( $P = .03$ ; see Table). The sensitivity of the MAT was 39% (95% CI = 20-61%), the specificity 86% (95% CI = 70-95%), the positive predictive value 64% (95% CI = 36-86%), and the negative predictive value 69% (95% CI = 53-81%). The accuracy of the MAT was 68% (95% CI = 37-98%).

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** The MAT is inaccurate and lacks sensitivity and is thus a poor tool for assessing palmar arch patency. We recommend palmar arch duplex ultrasound be utilized as the primary diagnostic tool for evaluating the collateral circulation of the hand, especially prior to procedures that may compromise radial artery blood flow.

Table 1: Comparison of MAT to palmar duplex ultrasonography

<u>MAT</u>	<u>Duplex ultrasound</u>		<u>Totals</u>
	Incomplete arch	Complete arch	
Positive MAT (incomplete arch)	9	5	14
Negative MAT (complete arch)	14	31	45
Totals	23	36	59

P = .03; MAT = Modified Allen's test

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 5

### **Early Access of Bovine Carotid Artery Graft Can eliminate the Use of Tunneled Hemodialysis Catheters**

Author(s): Anuj Mahajan, MD, Sherwin Abdoli, Sukgu Han, MD, Christian Ochoa, MD

Institution(s): University of Southern California, Los Angeles

**OBJECTIVES:** Advantage of arteriovenous graft (AVG) in reducing infectious complication over tunneled hemodialysis catheter for patients without native fistula options has been established. Standard AVG access requires 2 weeks prior to cannulation to avoid complications from early access. Limited studies are available to evaluate the efficacy of bovine carotid artery graft (BCAG) for subsequent early access. We report our experience with BCAG who underwent early access at our institution.

**METHODS:** All patients who underwent placement of BCAG for hemodialysis access were reviewed from November 2013 to February 2016. Early access was defined as less than 7 days after implantation. Outcome variables included primary, secondary patency rates, and graft-related complications. Kaplan Meier Survival Analysis was performed to evaluate primary and secondary patency.

**RESULTS:** During the study period, 70 patients underwent BCAG implantation. Thirty-one (44%) patients underwent successful early access. Of those patients, eighteen (58%) patient has successful dialysis on post-operative day 1. Indications for primary BCAG placement were the presence of disadvantaged vein with no previous access, infected or non-functional catheters. Twelve (38%) patients had primary graft BCAG placement for disadvantaged veins. Secondary graft placement was done in nineteen (61%) patients with the most common indication being aneurysmal degeneration of the fistula (32%). Two of the secondary graft patients required tunneled catheter placement. Four patients had secondary graft placement for bleeding fistula and five patients had secondary graft placement due to fistula thrombosis. One patient developed a graft hematoma and another patient developed early graft infection. Thirty-day primary and secondary patency was 77% and 94%, respectively. Six-month primary and secondary patency was 63% and 88% respectively (Figure1-2). Most common reason for 30-day graft failure in first was outflow vein stenosis (50%). There was one mortality in the 30-day

# SCIENTIFIC SESSION ABSTRACTS continued

postoperative period. See Figure 1 and 2 for a visual comparison of primary and secondary patency.

**CONCLUSIONS:** Early access of bovine carotid artery graft is a viable alternative in patients with disadvantaged veins. Temporary tunneled catheter can nearly be eliminated in patients who require revision due to bleeding and aneurysmal degeneration.

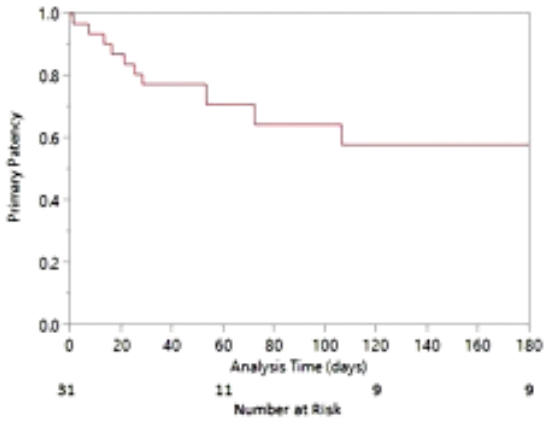


Figure 1: Primary Patency of Bovine Carotid Artery Grafts

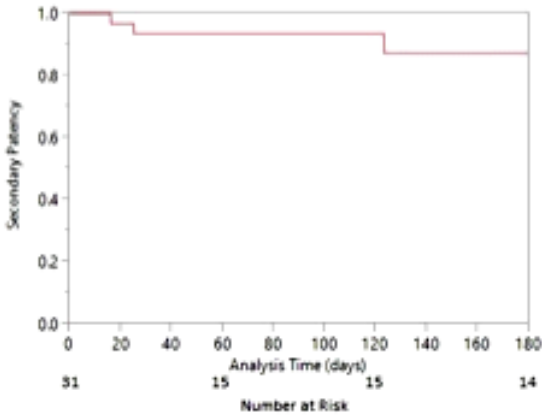


Figure 2: Secondary Patency of Bovine Carotid Artery Grafts

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 6

### **Bifurcated-Bifurcated Aneurysm Repair: A Novel Technique to Repair Infrarenal Aortic Aneurysms in the Setting of Iliac Aneurysms**

Author(s): Susanna Shin, MD, Benjamin Starnes, MD

Institution(s): University of Washington, Seattle

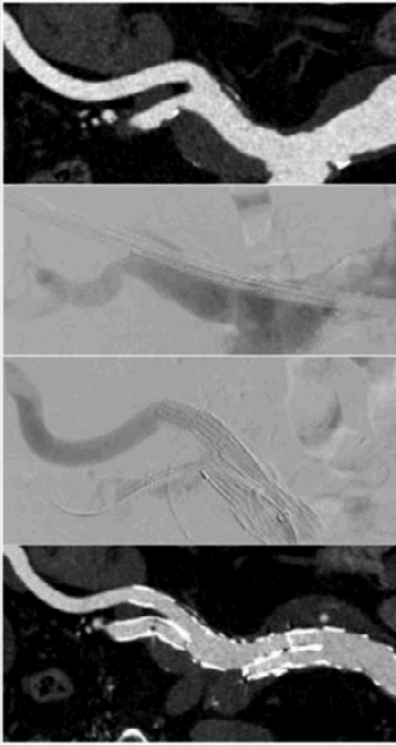
**OBJECTIVES:** Up to 20% of abdominal aortic aneurysms (AAA) have co-existent iliac artery aneurysms (IAA), and in the past, endovascular repair (EVAR) required internal iliac artery (IIA) embolization leading to debilitating pelvic or buttock ischemia. We describe a technique that utilizes an off-the-shelf bifurcated graft in the common iliac artery (CIA) to maintain IIA perfusion (Figure 1).

**METHODS:** A retrospective analysis was performed of patients with AAA with co-existing IAA undergoing bifurcated-bifurcated repair from August 2009 to May 2015 at a single institution. A 22mm or 24mm bifurcated main body device was used in the CIA ipsilateral to the IAA with extension of the “mating” limb into the IIA. Outcome measures included operative technical success and a composite outcome measure of IIA patency and freedom from re-intervention and clinically significant endoleak at one year.

**RESULTS:** Twelve patients underwent bifurcated-bifurcated repair over the study period. Technical success was 92% (11 of 12) with successful treatment of the AAA and IAA and preservation of flow to at least one IIA. In one case, the IIA could not be selected and therefore traditional EVAR was performed with IIA exclusion. In initial cases, brachial artery access was included in the initial plan but over time, the procedure was performed with a completely percutaneous femoral approach. At a median follow up of 10 months, there have been no IIA occlusions or endoleaks associated with the iliac bifurcated device. There was one case of external iliac limb occlusion at the 1-month follow up visit, which was treated with thrombectomy and stenting of the kink in the limb. No patients experienced buttock/hip claudication ipsilateral to the preserved IIA. No type 1 or 3 endoleaks were observed in the follow-up period. Two type 2 endoleaks were present but did not require re-intervention. The composite outcome was achieved in 83% of cases (5 of 6).

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Off-the-shelf bifurcated-bifurcated aneurysm repairs for Aorto-iliac aneurysm disease can be safely and efficiently performed in a majority of cases to maintain IIA perfusion and avoid pelvic ischemic complications. Attention should be directed at purpose-built bridging stents for the general purpose of branch vessel preservation. Comparison to historical controls with IIA embolization is warranted.



*Figure 2: Bifurcated-Bifurcated Aneurysm Repair*

*1A. Pre-operative CTA of common iliac artery aneurysm*

*1B. Intra-operative angiogram prior to bifurcated iliac graft deployment*

*1C. Intra-operative angiogram after to bifurcated iliac graft deployment*

*1D. Post-operative CTA of the excluded common iliac artery aneurysm with preserved flow to internal iliac artery*

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 7

### **Preoperative Hypoalbuminemia is Associated with Poor Clinical Outcomes after Open and Endovascular Abdominal Aortic Aneurysm Repair**

Author(s): Elica Inagaki, MD<sup>1</sup>, Alik Farber, MD<sup>1</sup>, Mohammad H. Eslami, MD MPH<sup>1</sup>, Jeffrey Kalish, MD<sup>1</sup>, Matthew R. Peacock, BS<sup>2</sup>, Denis V. Rybin, PhD<sup>2</sup>, Gheorghe Doros, PhD<sup>2</sup>, Jeffrey J. Siracuse, MD<sup>1</sup>

Institution(s): <sup>1</sup>Boston Medical Center, Mass. <sup>2</sup>Boston University School of Medicine, Mass.

**OBJECTIVE:** The impact of preoperative malnutrition on outcomes in major vascular surgical patients is unclear. We investigated the effects of preoperative hypoalbuminemia, a marker for malnutrition, on outcomes of open abdominal aortic aneurysm repair (OAR) and endovascular abdominal aortic aneurysm repair (EVAR).

**METHODS:** Patients undergoing OAR or EVAR were identified in the 2005-2012 American College of Surgeons National Surgical Quality Improvement Program database and stratified into three groups: normal (serum albumin >3.5 g/dL), moderate hypoalbuminemia (2.8-3.5 g/dL), and severe hypoalbuminemia (<2.8 g/dL). Multivariable analyses were performed to assess the association of preoperative hypoalbuminemia with 30-day morbidity and mortality.

**RESULTS:** We identified 15002 patients with a recorded preoperative serum albumin who underwent OAR (n=4956) or EVAR (n=10046). In both OAR and EVAR cohorts, patients with hypoalbuminemia had higher burden of comorbidities, such as dyspnea at rest, peripheral vascular disease, and dialysis dependence (P<.005). Multivariable analyses demonstrated that moderate hypoalbuminemia was associated with higher risks of mortality (OR 1.3, 95% CI 1.02-1.7) and postoperative length of stay (LOS) (means ratio [MR] 1.1, 95% CI 1.04-1.2), whereas severe hypoalbuminemia was associated with increased mortality (OR 1.9, 95% CI 1.4-2.7), pulmonary complications, (OR 1.4, 95% CI 1.1-1.9), reoperation (OR 1.8, 95% CI 1.3-2.5) and postoperative LOS (MR 1.3, 95% CI 1.2-1.5) in OAR patients. In EVAR patients, moderate hypoalbuminemia was associated with higher risks of mortality (OR 1.9, 95% CI 1.4-2.6), pulmonary complications (OR 1.6, 95% CI 1.3-2.0), reoperation (OR 1.4, 95% CI 1.1-1.7), and postoperative LOS (MR 1.2, 95% CI 1.2-1.3),

## SCIENTIFIC SESSION ABSTRACTS continued

whilst severe hypoalbuminemia was associated with increased mortality (OR 3.0, 95% CI 2.0-4.5), pulmonary complications (OR 1.9, 95% CI 1.3-2.7), reoperation (OR 1.5, 95% CI 1.1-2.2) and postoperative LOS (MR 1.5, 95% CI 1.4-1.6).

**CONCLUSIONS:** Preoperative hypoalbuminemia is associated with increased perioperative morbidity and mortality in a severity-dependent manner among patients undergoing EVAR and OAR. Evaluation and optimization of nutritional status should be performed preoperatively in this high-risk population.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 8

### **Morbidity of Endovascular Abdominal Aortic Aneurysm Repair is Directly Influenced by Size but Remains Less Than Open Repair**

Author(s): Douglas M. Overbey, MD, Brandon C. Chapman, MD, Patrick W. Hosokawa, MS, John C. Eun, MD, Mark R. Nehler, MD

Institution(s): University of Colorado, Aurora

**OBJECTIVE:** Previous randomized controlled trials have defined specific size thresholds to guide surgical decision making in patients presenting with an abdominal aortic aneurysm (AAA). With recent advances in endovascular techniques, the anatomic considerations of AAA repair are rapidly changing. Our specific aims were to evaluate the most recent national population data to compare anatomical differences and perioperative outcomes in patients with AAA.

**METHODS:** The ACS-NSQIP was queried from 2011-2014 utilizing the targeted vascular public use file. Patients with AAA undergoing elective open or endovascular repair were included. Risk factors and outcomes were stratified by size and divided into quartiles for logistic comparison. A logistic regression model was used to compare the impact of size on morbidity and mortality with each technique. A risk-adjustment model used all pre-operative criteria to compare the observed and expected morbidity for open and endovascular repair.

**RESULTS:** 7,775 patients underwent AAA repair: 6,238 (80.2%) endovascular and 1,537 (19.8%) open. Repairs were divided into density quartiles for a logistic analysis: smallest quartile 0.6-5cm, second quartile 5.01-5.5cm, third quartile 5.51-6.2cm, and largest quartile >6.2cm. Patients with larger aneurysms (>6.2cm) were more likely to be male, have a dependent functional status, and increased BUN and ASA score ( $p<0.001$ ). Larger aneurysms had longer operative time (195 vs 162 minutes) and greater extension toward the renal and iliac vessels (all  $p<0.001$ ) (table 1). Endovascular repair was associated with an increased morbidity of 8.7% per centimeter increase in size (OR 1.09, 95% CI 1.04-1.14), an effect not seen in open repair (95% CI 0.99-1.18). Risk-adjustment revealed an observed-expected morbidity plot that favored endovascular repair throughout the size range, but confirmed lack of size effect within the open repair category (figure 1).

# SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Patients with larger AAA have comorbidities and anatomical factors associated with a more difficult repair. Aneurysm size has a disproportional effect on morbidity of endovascular repair, favoring earlier repair in this group. However, endovascular repair still results in fewer complications than open repair across all size strata.

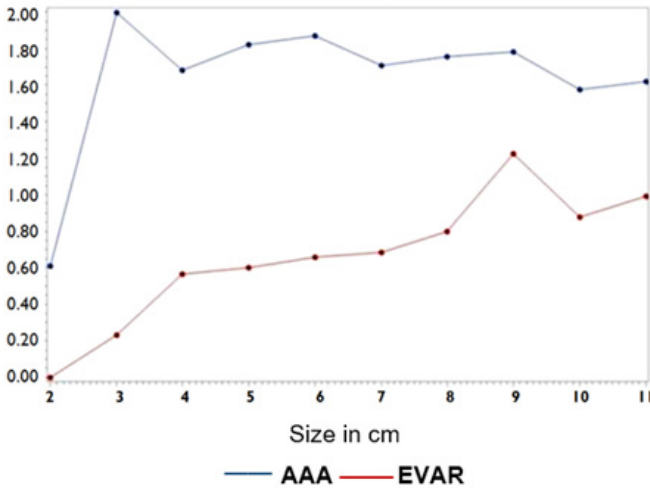


Figure 1: Observed: expected morbidity rates for open and endovascular AAA repair stratified by size of aneurysm

	0.6-5.0cm	5.01-5.5cm	5.51-6.2cm	>6.2cm	P
Patient Demographics	n=1,811	n=2,191	n=1,940	n=1,833	
Age (mean + std dev)(years)	71.4+9.1	73.3+8.5	74.3+8.6	74.7+8.8	<0.001
Gender-Male (%)	75.0	80.1	81.0	83.7	<0.001
Functional Status-Dependent (%)	2.1	1.7	2.4	4.9	<0.001
ASA 4/5 (%)	22.8	23.7	26.0	35.4	<0.001
Surgical Indication: Diameter (%)	79.5	93.7	90.8	80.4	<0.001
Proximal Aneurysm Extent: Infrarenal (%)	81.7	81.2	78.6	72.7	<0.001
Distal Aneurysm Extent: Proximal to Iliacs (%)	34.7	42.8	43.3	37.2	<0.001
Work RVU (mean+std dev)	25.1+4.8	25.5+4.6	26.0+5.1	26.6+6.7	<0.001
Operative Time (mean+std dev)(min)	156+85	156+87	173+92	195+111	<0.001
Morbidity-30 day (%)	19.9	22.1	28.8	38.2	<0.001
Mortality-30 day (%)	1.3	1.2	1.8	3.4	<0.001

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 9

### **The Role of Endovascular Therapy in Contemporary Management of Mycotic Aortic Aneurysms and Associated Aortoerodigestive Fistulas**

Author(s): Ramsey S. Elsayed, MD, Sung W. Ham, MD, Miguel F. Manzur, MD, Sukgu M. Han, MD, Wesley K. Lew, MD, Vincent L. Rowe, MD, Fred A. Weaver, MD

Institution(s): Keck Medical Center of USC, Los Angeles

**OBJECTIVE:** Infections of the aorta or previous aortic repairs carry a grave prognosis. While open repair can be definitive, it carries a high rate of morbidity and mortality. The role of endovascular (EV) therapy as a bridge to definitive open repair (BDR) remains poorly defined.

**METHODS:** All patients who underwent EV repair as a BDR or for palliation (PR) for native aortic or graft infection between 2005 and 2015 were retrospectively reviewed. Patient baseline characteristics, aneurysm location, 30-day/in-hospital and mid-term outcomes were reviewed.

**RESULTS:** Twenty-four patients, BDR (54%) and PR (46%) underwent EV repair during the study period. Indications for intervention included de-novo mycotic pseudoaneurysm (12), aortoerodigestive (AAD) fistula (10), 7 of which were infection of prior aortic grafts, and infection of prior aortic graft only (2). Anatomic locations: thoracic (8), abdominal (12) and thoracoabdominal (4). Eleven patients presented with rupture, (55%) BDR, (45%) PR. Sixteen were hemodynamically unstable and 38% presented with gastrointestinal bleed. Etiologies: microbial arteritis with aneurysm (5) contiguous spread from localized infection (7), erosion of anastomotic aneurysm from prior aortic repair (6), erosion of penetrating aortic ulcer (2), iatrogenic (2), and cryptogenic (2). MRSA was isolated in 59% of patients. EV therapy excluded the aneurysm or fistula in all patients with a technical success of 100%. Of the 13 patients in BDR group, 6 (46%) had interval definitive repair (graft explant, fistula resection), whereas 2 of 11 (18%) patients in the PR group required endoleak repair correlating with overall aortic reinterventions in 8 of 24 (33%). All patients received long-term antibiotics. In-hospital/30-day mortality was 12.5% all of which occurred in the PR group. Median follow-up was 82 days (range 10-2474 days). Mid-term mortality was 57% (50% BDR and 50% PR).

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSION:** EV treatment is effective in the management of acute life-threatening complications of mycotic aortic aneurysms and AAD fistulas in both palliative and temporizing settings. Early mortality is acceptable particularly when used as a BDR, with most aortic reinterventions occurring as a planned procedure. However, mid-term mortality is significant and likely represents the lethal nature of this disease.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 10

### **Management of Symptomatic Unruptured Aortic Aneurysms Over the Past 20 Years**

Author(s): Karen Trang, E. John Harris, MD, Ronald L. Dalman, MD, Jason T. Lee, MD, Matthew W. Mell, MD, Venita Chandra, MD

Institution(s): Stanford University, Calif.

**OBJECTIVE:** We compared the management of patients with symptomatic, unruptured aortic aneurysms (sxAAA) treated at a tertiary care center between two decades. This twenty-year time period encapsulated a shift in surgical approach to aortic aneurysms from primarily open to primarily endovascular, and we sought to determine the impact if any of this shift.

**METHODS:** Two thousand three hundred and eighty consecutive patients treated at a tertiary care hospital by six staff surgeons were reviewed between 1995-2005 (period 1) and 2005-2015 (period 2). Of those patients 156 (6.5%) were treated for symptomatic unruptured aortic aneurysms and were included in our study. Patient demographics, operative approach and outcomes were analyzed and compared for each period.

**RESULTS:** Period 1 included 72 patients treated for sxAAA (80.6% infrarenal, 15.3% juxtarenal, 2.8% TAA-4, and 1.8% endoleak after EVAR). 70.8% of patients were treated with open repair and 29.2% were treated with an endovascular repair. Period 1 patients had an average age of  $74.9 \pm 9.4$  and were made up of 63.9% men. In-hospital mortality during this period was 4.2% (5.9% for open cohort and 0% for endovascular). Period 2 included 84 patients treated for sxAAA (72.6% infrarenal, 15.5% juxtarenal, 7.1% TAA-4, and 4.8% endoleak after EVAR). 32.1% were treated open and 67.9% underwent endovascular repair. The average age in this cohort was  $73.0 \pm 9.8$ , and 76.2% were men. In-hospital mortality was 1.2% (3.7% for open cohort and 0% for endovascular). Period 2 had a significantly higher rate of endovascular repair compared to period 1 ( $p < 0.0001$ ), and a trend towards decreased mortality and increased aneurysm complexity. The length of hospital stay was significantly longer in the open cohort compared to endovascular for both periods ( $p < 0.02$ ).

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** To our knowledge, this is the largest single institution cohort of symptomatic unruptured aortic aneurysms. As to be expected, we found a significant change in the approach to these patients from a primarily open to a primarily endovascular technique between decades, associated with decreased mortality and increased operative complexity. Overall the incidence and mortality, however, for both periods appear to be lower than previously published.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 11

### **Intraluminal Thrombus is Associated with Aortic Wall Weakening in Small Ruptured Abdominal Aortic Aneurysms**

Author(s): Jeffrey D. Crawford, MD, Stephen J. Haller, BS, Gregory J. Landry, MD, Cherrie Abraham, MD, Gregory L. Moneta, MD, Sandra Rugonyi, PhD, Amir F. Azarbal, MD

Institution(s): Oregon Health and Sciences University, Portland

**OBJECTIVES:** Intraluminal thrombus (ILT) in abdominal aortic aneurysm (AAA) has been shown to provide both a biomechanical advantage by decreasing peak wall stress (PWS) while also acting as a nidus of inflammation and resultant aortic wall degeneration. In this study, we sought to explore the association between ILT and the risk of AAA rupture (rAAA) in small, high-risk aneurysms.

**METHODS:** Patients treated at our institution from 2001-2014 for rAAA were retrospectively identified. Patients with small rAAA (< 60 mm) with high-resolution computed tomography angiography (CTA) available for study were included. These patients were considered high-risk aneurysms given that they ruptured at relatively small AAA diameters. For comparison, a low-risk cohort of patients with large non-rAAA (≥ 60 mm) with high-resolution preoperative CTA were sequentially identified. Three dimensional AAA anatomy was digitally reconstructed for each patient and ILT percent volume was computed ( $\text{ILT percent volume} = (\text{volume ILT} / [\text{volume ILT} + \text{volume lumen}]) \times 100$ ). Finite element analysis (FEA) was then performed to calculate AAA mean and peak wall stress (MWS, PWS) distributions for each patient.

**RESULTS:** Patient demographics and results are summarized in Table 1. Patients with small rAAA had greater ILT percent volume compared to patients with large non-rAAA ( $69 \pm 12\% \text{ v } 57 \pm 12\%$ ,  $p = .02$ ) (Figure 1A). Patients with small rAAA had lower mean wall stress (MWS) ( $47 \pm 17 \text{ kPa v } 72 \pm 19 \text{ kPa}$ ,  $p = .003$ ) and PWS ( $119 \pm 40 \text{ kPa v } 237 \pm 96 \text{ kPa}$ ,  $p < .001$ ) compared to patients with large non-rAAA (Figure 1B). Increased ILT percent volume was associated with both decreased MWS and decreased PWS (Figure 1: C-D).

# SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Although increased ILT percent volume is associated with lower MWS and PWS, it is also associated with rAAA at smaller diameters. Therefore, the protective biomechanical advantage of ILT in lowering PWS seems to be outweighed by weakening of the aortic wall in patients with small rAAA. Increased ILT percent volume may be a surrogate marker for decreased aortic wall strength and a marker of high risk AAAs.

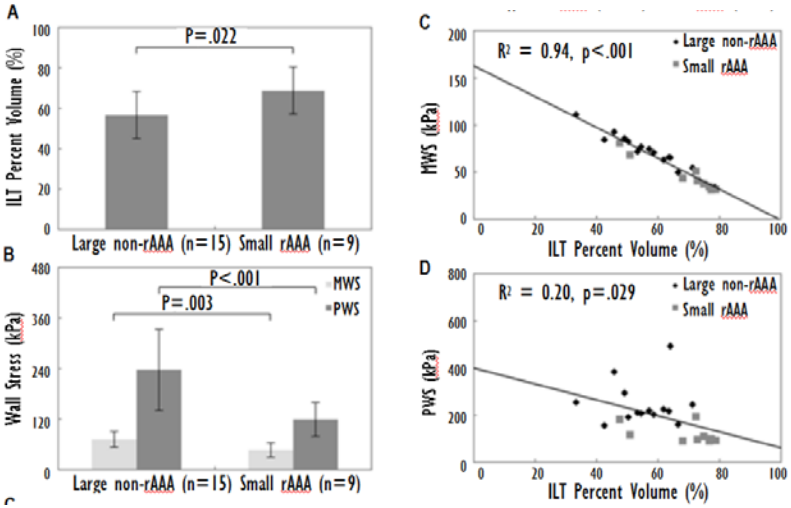


Table 1. Patient Demographics and Results Summary

Demographics	Large Non-rAAA (%) (n=15)	Small rAAA (%) (n=9)	P
AAA diameter (mm)	68.1 ± 11.9	52.1 ± 7.6	.002
Age (years)	70.8 ± 9.7	67.9 ± 5.7	NS
Male	13 (86.7)	6 (66.7)	NS
Hypertension	9 (60.0)	8 (88.9)	NS
Smoker	15 (100.0)	9 (100.0)	NS
ILT volume (ml)	161 ± 79	92 ± 32	.007
ILT percent volume (%)	56.7 ± 11.6	68.8 ± 11.6	.022
Mean ILT thickness (mm)	8.1 ± 2.3	8.4 ± 2.3	NS
MWS (kPa)	72 ± 19	47 ± 17	.003
PWS (kPa)	273 ± 96	119 ± 40	<.001
Mean ± SD			

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 12

### **Does The Outcome of Type II Endoleaks After EVAR Justify Conservative Management?**

Author(s): Mark Ajalat, Russell Williams, MD, Samuel E. Wilson, MD

Institution(s): Long Beach VA Medical Center, Calif.

**OBJECTIVES:** Management of type II endoleaks (T2Ls) after endovascular aneurysm repair (EVAR) has been controversial. Some advocate that T2Ls have a benign course, while others believe that T2Ls can lead to aneurysm expansion and rupture, thus intervention is indicated. This study investigated the natural history of T2Ls using data from a single center in order to derive direction in management.

**METHODS:** Using the computerized patient record system (CPRS), patients who had endoleaks after EVAR were identified independently by a radiologist and a member of the vascular surgery team. The identified T2Ls were analyzed for the following outcomes: rupture, endoleak duration, spontaneous resolution, changes in the size of the aneurysm sac, and reintervention rates.

**RESULTS:** Of the 160 patients who had completed required follow up to date (mean 3.5 years) after EVAR, 39 patients (22.0%) were identified as having a T2L on CTA imaging. One patient (2.56%), who did not have any type I or II endoleak died of a ruptured aneurysm after 0.9 cm expansion. Of the 39 patients, 6 (15.4%) required repair due to aneurysm sac growth. Two (5.13%) were repaired with an open procedure and 4 (10.3%) with an endovascular approach. Of these 6 aneurysms requiring repair, 4 (66.7%) had a simultaneous endoleak (types I or III) in addition to the identified T2L. Spontaneous resolution of T2L occurred in 16 (41.0%) patients and persistent endoleaks lasting longer than 6 months occurred in 22 (56.4%). Four patients (10.3%) had delayed T2Ls that presented 4, 9, 12, and 23 months after their 30 day post op CT was normal. None of the 4 patients with delayed T2Ls required reintervention and none had aneurysm sac growth greater than 5 mm. Of the 39 patients with T2Ls, 8 (20.5%) were associated with an additional type I or III endoleak and 31 (79.5%) had an isolated T2L. Among these 31 patients with only T2Ls, 8 (25.8%) had an aneurysm sac growth greater than 5 mm, none of whom had additional treatment.

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Overall, we found that 85% of patients who had T2Ls did not require intervention. The one aneurysm related mortality in our 160 patients did not have any identifiable endoleak. The association of a type I or III endoleak with a T2L was more likely to require correction due to aneurysm expansion. T2Ls associated with another type of endoleak require more aggressive management.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 13

### **Fifty Liter Blood Loss Without a Single Blood Transfusion: Report of Rapid Re-circulation of Unprocessed Blood in Emergency Thoracic Aortic Surgery**

Author(s): Jason Faulds, MD<sup>1</sup>, Anthony Estrera, MD<sup>2</sup>, Hazim Safi, MD<sup>2</sup>

Institution(s): <sup>1</sup>Vascular Surgery, University of British Columbia, Vancouver,  
<sup>2</sup>University of Texas, Houston

**BACKGROUND:** With refinements in surgical technique and improvement in the recognition and treatment of coagulopathy, uncontrolled hemorrhage is a rare event during thoracic aortic surgery. We present a case of intra operative rupture of a thoracic aortic pseudoaneurysm, in which the cell saver was used without processing the salvaged blood due to the patients marked hemodynamic instability. In this case, despite over 50 L of blood scavenged from the operative field, the patient did not require a single unit of autologous blood transfusion during his hospital stay.

A 46-year-old male was referred for management of an asymptomatic 6.3 cm descending thoracic aortic pseudoaneurysm at the site of a previous aortic coarctation patch repair. Computed Tomography (CT) demonstrated a 6.3 cm pseudoaneurysm at the site of the thoracic aortic patch repair and the presence of a 3.2 cm aneurysm of the proximal left subclavian artery.

**METHODS:** Through a left posterolateral thoracotomy, the chest was entered. During the dissection of the lung from the underlying aneurysm, prior to achieving proximal control, the aneurysm ruptured. Despite attempts at proximal control with manual pressure, the patient exsanguinated and developed a short pulseless arrest. At this point the reservoir of the cell saver was connected to the 8 Fr central line and salvaged blood was returned to the patient at a flow rate of 1 L/min. This aggressive fluid resuscitation resulted in return of a pulse and measureable blood pressure. With manual proximal control, we rapidly secured a new temporary Dacron patch (4X4 cm) and achieved hemostasis.

With return of hemostasis the patient's status stabilized and we proceeded with our planned left heart bypass for distal aortic perfusion. Proximal aortic control

## SCIENTIFIC SESSION ABSTRACTS continued

was obtained proximal to the left subclavian artery and the aorta clamped. The aorta was divided and completely separated from the underlying esophagus, and a 24mm Dacron interposition graft was secured between the distal transverse arch and the descending thoracic aorta to complete our extent A repair.

**RESULTS:** The patient remained hemodynamically normal and stable throughout the remainder of the operation and recovered in the cardiovascular intensive care unit without any post-operative complication. He was discharged home on hospital day #7 and did not require any blood products.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 14

### **Lower Extremity CT Angiography Can Predict Technical Success of Endovascular Revascularization in the Superficial Femoral and Popliteal Arteries**

Author(s): Nathan K. Itoga, MD, Tanner Kim, MD, Anna M. Sailer, MD, Dominik Fleischmann, MD, Matthew W. Mell, MD

Institution(s): Stanford University Medical Center, Calif.

**OBJECTIVES:** Pre-procedural CT angiography (CTA) assists in evaluating vascular morphology, extent of disease and treatment planning in patients with peripheral artery disease (PAD). Given the cost and potential risks associated with CTA, the aim of the study was to determine the predictability of successfully treating chronic total occlusion (CTO) lesions based on radiographic findings in the femoral-popliteal (SFA/pop) region.

**METHODS:** Review of medical records and available imaging studies was performed for patients undergoing endovascular intervention for PAD between 01/2013 and 12/2015 at a single academic institution. Radiologists reviewed pre-operative CTA according to scoring criteria previously used to evaluate CTO lesions in the coronary arteries. Initial procedural success and primary patency were recorded according to re-intervention and elevated velocities on follow-up ultrasound.

**RESULTS:** From 2013-2015, 407 patients underwent 540 endovascular procedures for PAD. Pre-operative CTAs were performed in 218 patients (53.6%), and 90 of these found CTO lesions in the SFA/pop region. Of the 90 CTO lesions in the SFA/pop region, 65 were successfully treated (72%), 14 unsuccessfully crossed, and 11 untreated due to extensive disease or concomitant iliac intervention. The characteristics of the SFA/pop CTO lesions are reported in Table. Tasc A/ B lesions were treated 100% successfully while Tasc C/ D lesions were treated successfully 75% of the time,  $P=.016$ . Degree of calcification of the occluded vessel ( $P=.02$ ) predicted technical success. Length of occlusion ( $P=.24$ ), multiple occlusions ( $P=.23$ ), negative remodeling ( $P=.52$ ), and vessel runoff ( $P=.96$ ) were not associated with failure. On multivariable analysis 100% calcification remained the only significant predictor of technical failure (OR 15.8, 95% CI 2.7 - 92.5,  $P=.002$ ). The primary patency rates of

## SCIENTIFIC SESSION ABSTRACTS continued

SFA/pop CTO lesions treated endovascularly at 6-month and 1-year intervals were 80% and 57%, respectively.

**CONCLUSIONS:** Analysis of pre-operative CTAs shows 100% of calcification as the best predictor of unsuccessful endovascular treatment of CTOs in the SFA/pop region. Further studies are needed to determine cost-benefit of obtaining pre-operative CTA.

Table1: Radiographic Characteristics of Successful vs. Unsuccessful Endovascular Intervention in SFA/Pop CTOs				
<u>Characteristics</u>	<u>Total</u> (n = 79)	<u>Successful</u> (n=65)	<u>Unsuccessful</u> (n =14)	<u>P - value</u>
TASC Lesions				.016
A	5	5	0	
B	16	16	0	
C	28	22	6	
D	30	22	8	
Total Length of occlusion - cm (ó)		15.3 (11.5)	17.8 (9.5)	.24
Multiple occlusion (%)		21 (39)	3 (21)	.23
Negative Remodeling* (ó)		0.71 (0.20)	0.75 (0.19)	.52
Degree of Calcification - median		30	85	.02
100% Calcification (%)	10	4 (6)	6 (43)	<.001
Vessel Runoff (ó)		2.4 (0.6)	2.4 (0.7)	.96
*Negative remodeling - minimum diameter in lesion/ normal vessel diameter				

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 15

### **National Comparison of Hybrid and Open Repair for Aorto-iliac-femoral Occlusive Disease**

Author(s): Matthew Mell, MD, MS, Elsie Gyang Ross, Marco Zavatta, MD

Institution(s): Stanford University, Calif.

**OBJECTIVE:** To analyze the outcomes of revascularization for aorto-iliac-femoral occlusive disease by comparing hybrid repair (endovascular treatment and open common femoral endarterectomy, ER-CFE) with open aorto-iliac reconstruction and CFE (OR-CFE).

**METHODS:** Using the National SVS-VQI database from 2006 to 2015, we identified all patients receiving open or endovascular revascularization of the aorto-iliac system and who additionally underwent CFE. Patients with concomitant infra-inguinal procedures were excluded. Main outcome variables were 30-day mortality, length of stay (LOS), one-year mortality and patency, ankle brachial index (ABI), secondary interventions, major amputations, and ambulatory status.

**RESULTS:** The cohort comprised 2524 receiving ER-CFE and 1324 patients receiving OR-CFE. Patients with ER-CFE were older ( $68 \pm 0.2$  vs  $63 \pm 0.3$ ,  $p < 0.01$ ), and were more likely to have diabetes (36% vs 29%,  $p < 0.001$ ) and heart failure (14% vs. 9%,  $p < 0.01$ ). Those receiving OR-CFE were more likely to have received a previous inflow procedure (25% vs. 20%,  $p < 0.001$ ). A greater number of arterial segments were treated for patients undergoing OR-CFE ( $5.2 \pm 1.6$  vs  $2.9 \pm 1.0$ ,  $p < 0.01$ ). ER-CFE was associated with lower 30-day mortality (2.3 % vs. 3.9%,  $p = 0.004$ ) and shorter LOS (median 3 vs. 7 days,  $p < 0.01$ ). Follow-up was available for 44.1% of the cohort (44.3% OR-CFE vs. 44.0% ER-CFE,  $p = ns$ ). Those receiving ER-CFE had higher one-year mortality (10.6% vs. 6.2%,  $p < 0.01$ ), fewer re-interventions (7.2% vs. 10.3%,  $p = 0.03$ ), and equivalent major amputation rate (3.3%). Patients with OR-CFE had greater improvement in ABI ( $0.40 \pm 0.4$  vs.  $0.26 \pm 0.4$ ,  $p < 0.001$ ), and were more likely to achieve improved ambulatory status (82.0% vs. 67.6%,  $p < 0.01$ ).

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** For patients with aorto-iliac-femoral occlusive disease, endovascular repair with concomitant CFE appeared to have improved short-term outcomes and equivalent freedom from major amputation compared with open surgical repair with CFE. Conversely, open repair with CFE was associated with better long-term improvement in ABI and ambulatory status. Open repair should therefore be considered for patients with aorto-iliac-femoral occlusive disease and reasonable surgical risk.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 16

### **Isolated Iliac Vascular Injuries - Morbidity of Repair vs Ligation of Iliac Vein Injury**

Author(s): Gregory A. Magee, MD, MSc<sup>1,2</sup>, Jayun Cho, MD<sup>2</sup>, Elizabeth Benjamin, MD, PhD<sup>2</sup>, Kazuhide Matsushima, MD<sup>2</sup>, Aaron Strumwasser, MD<sup>2</sup>, Kenji Inaba, MD<sup>2</sup>, Omid Jazaeri, MD<sup>1</sup>, Charles Fox, MD<sup>1</sup>, Demetrios Demetriades, MD, PhD<sup>2</sup>

Institution(s): <sup>1</sup>University of Colorado, Aurora, <sup>2</sup>University of Southern California, Los Angeles

**OBJECTIVE:** The incidence of morbidity and mortality for iliac vascular injuries in the literature are likely over-estimated due to associated injuries and data for isolated iliac vascular injuries are very limited. No large studies have reported the incidence of morbidity for repair vs ligation of isolated iliac vein injuries. Novel endovascular therapies have refocused attention on the algorithm for pelvic trauma and balloon occlusion of the aorta may allow for more expeditious repair of arterial injuries.

**METHODS:** Patients in the NTDB (2007-2012) with at least one iliac vascular injury were analyzed. Isolated iliac vessels were defined as cases with AIS severity score <3 for extra-abdominal injuries and organ injury scale (OIS) grade <3 for the intra-abdominal injuries.

**RESULTS:** Overall, 6,262 iliac vascular injuries (2,809 penetrating, 3,453 blunt) were identified out of 271,076 patients with abdominal trauma (2.3%). 3,379 patients (1,841 penetrating, 1,538 blunt) had isolated iliac vascular injuries (1.2%). 557 patients (514 penetrating, 43 blunt) had combined iliac artery & vein injuries (0.2%). 30-day-mortality was 16.5% for isolated iliac vein injury, 19.3% for isolated iliac artery injury, and 48.7% for combined isolated iliac artery & vein injury. Patients with isolated iliac vein injuries due to penetrating trauma had morbidity rates of: DVT (repair 14.6%, ligation 14.1%,  $p=0.875$ ), PE (repair 1.8%, ligation 0.5%,  $p=0.38$ ), fasciotomy (repair 9.3%, ligation 14.6%,  $p=0.094$ ), amputation (1.8% repair, 2.6% ligation,  $p=0.738$ ), AKI (5.8% repair, 4.7% ligation,  $p=0.627$ ).

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Isolated vascular injuries are associated with high incidence of mortality, especially for combined venous and arterial injury. There was a trend towards a higher rate of PE and lower rate of fasciotomy for repair of isolated iliac vein injuries from penetrating trauma compared to ligation. Comparison of morbidity and mortality of repair vs ligation is limited by presentation bias.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 17

### **Decreased Apoptosis and Increased Pro-Angiogenic Gene Expression in P27Kip1 Deficient Mouse Collaterals After Hindlimb Ischemia**

Author(s): Galit Ankri-Eliahoo, PhD, Frank Dastvan, BS, Gale L. Tang, MD

Institution(s): University of Washington, Seattle

**OBJECTIVES:** Previous studies showed that the gene p27kip1 (p27) affects the human response to arterial injury as well as collateralization after hindlimb ischemia in mice. The exact mechanism through which p27 works is not yet known. We hypothesized that there would be less apoptosis (lower bax/bcl2 ratio) in p27<sup>-/-</sup> (ko) mice collateral arteries after hindlimb ischemia and more expression of pro-angiogenic genes (mmp2, foxo3, tgf- $\beta$  and tnf- $\alpha$ ) than in p27<sup>+/+</sup> (wt) collateral arteries.

**METHODS:** Ko and wt mice had their femoral and collateral arteries harvested seven days after hindlimb ischemia for RNA isolation and qRT-PCR. siRNA knock-down of p27 was performed on vascular smooth muscle cells (VSMC) isolated from wt aortae, and MMP2 mRNA expression level was measured using qRT-PCR. MOVATs pentachrome staining was performed on wt and ko hindlimb sections 28 days after hindlimb ischemia.

**RESULTS:** bax mRNA expression increased significantly more in wt collaterals after hindlimb ischemia than in ko collaterals. There was no significant difference in the bcl2 mRNA expression for the ischemic collaterals between the two groups. Therefore, the ratio of bax/bcl2 mRNA expression was significantly lower in ko gracillis collaterals compared to wt collaterals after hindlimb ischemia. mmp2, foxo3, tgf- $\beta$ , and tnf- $\alpha$  mRNA expression increased significantly more in ko collaterals after ischemia than in wt collaterals. We also found that mmp2 mRNA expression increased by 237% after 89% siRNA knock down of p27 in wt VSMC. MOVATs staining showed that the collateral wall thickness was 133 $\pm$ 27% higher in ko mice compared to wt mice by 28 days after hindlimb ischemia (p<0.02).

**CONCLUSIONS:** The ko collaterals had significantly less apoptosis than wt collaterals and significantly higher mRNA expression of pro-angiogenic genes. MMP2 mRNA expression increased significantly more in p27 ko

## SCIENTIFIC SESSION ABSTRACTS continued

collaterals after hindlimb ischemia. These results may explain why p27 ko mice revascularize better than wt mice after hindlimb ischemia and suggest that p27 may have additional effects other than regulating MMP2 expression in the collateralization response.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 18

### **The Impact of Statin Therapy on the Primary Patency of Femoral and Popliteal Artery Stents**

Author(s): Derek de Grijjs, MD<sup>1</sup>, Pedro Teixeira, MD<sup>2</sup>, Steven G. Katz, MD<sup>3</sup>

Institution(s): <sup>1</sup>Department of Surgery, Huntington Memorial Hospital, Pasadena, Calif., <sup>2</sup>Department of Surgery and Perioperative Care, University of Texas at Austin Dell Medical School, <sup>3</sup>Division of Vascular Surgery and Endovascular Surgery, Keck School of Medicine, University of Southern California, Los Angeles

**OBJECTIVE:** It has long been known that HMG-CoA reductase inhibitors (statins) broadly reduce cardiovascular events in patients with peripheral vascular disease. It is the goal of this study to determine if statin therapy significantly improves primary patency rates following stenting of superficial femoral and popliteal arteries.

**METHODS:** The records of all patients undergoing primary nitinol stenting of the femoral and popliteal arteries at a single institution and by a single surgeon during a 7-year period were reviewed. Patient demographics and risk factors were identified. TransAtlantic InterSociety Consensus (TASC II) classifications were determined for all stented lesions to stratify severity of disease. Analysis was performed to determine whether the use of statins at the time of stent placement influenced patency. Loss of primary patency was said to have occurred when an intra-stent occlusion or a 50% or greater stenosis was identified by arterial duplex or angiography. Kaplan-Meier survival curves were plotted, and differences between groups tested by log rank method.

**RESULTS:** Between 2007 and 2014 primary femoral or popliteal stenting was performed on 162 limbs in 141 patients. At the time of intervention 55.5% of these patients were being treated with statin therapy. Eighty-eight interventions were done for claudication, and 74 for critical limb ischemia (CLI). One-hundred and seven lesions treated were TASC A or B, and 55 were TASC C or D. Primary patency rates for all stented lesions was 68%, 53%, and 43% at 12, 24, and 36 months. Those on statins had patency rates of 75%, 58%, and 47%, while the patency rates for those not on statins was 55%, 45%, and 36% at 12, 24, and 36 months respectively ( $p=.179$ ). Statins had no significant influence on

## SCIENTIFIC SESSION ABSTRACTS continued

patency rates when lesions were stratified for severity (TASC A/B  $p = .162$ , C/D  $p = .638$ ). There was no significant difference in those treated for claudication or CLI ( $p = 0.929$ ). Statin compliance was found to be 86% at a mean follow-up of 23.6 months.

**CONCLUSIONS:** While the use of statins has been shown to reduce cardiovascular morbidity and mortality in patients with peripheral vascular disease, the ability of these drugs to improve primary patency rates of patients following superficial femoral and popliteal artery stenting remains speculative.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 19

### **Cryopreserved Saphenous Vein: Last Ditch Conduit for Limb Salvage?**

Author(s): Leigh Ann O'Banion, MD, Bian Wu, MD, Charles M. Eichler, MD, Linda M. Reilly, MD, Michael S. Conte, MD, Jade S. Hiramoto, MD

Institution(s): University of California, San Francisco

**OBJECTIVE:** In patients lacking autogenous vein suitable for infrainguinal bypass, cryopreserved saphenous vein (CSV) allograft (Cryolife, Inc.) may be an acceptable alternative. However, long-term follow up is lacking. The purpose of this study is to examine outcomes of CSV conduit for infrainguinal revascularization.

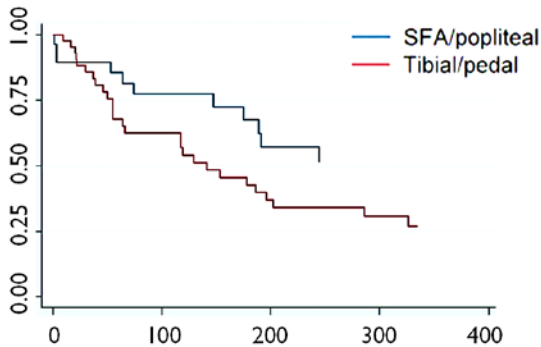
**METHODS:** Between 2/2008 and 8/2015 72 patients underwent infrainguinal bypass grafts in 75 limbs using CSV. All patients were treated by a multidisciplinary Limb Preservation Team and lacked suitable arm or leg vein. Demographic data and patient outcomes were retrospectively collected using electronic medical records.

**RESULTS:** The mean age of our cohort was 70 +/- 14 years and 37/72 (51%) were male. 47/72 (65%) were Caucasian, 39/72 (54%) had coronary artery disease, 29/72 (40%) had diabetes, 57/72 (79%) had hypertension, and 52/72 (72%) were former/current smokers. Median follow up was 304 days (IQR: 130-1051 days). Indications for the index operation included claudication (2%), rest pain (25%), tissue loss (53%), and prosthetic graft infection (17%). 62/75 (83%) bypasses were performed for critical limb ischemia (CLI) and 46/75 (61%) were revision operations. Distal targets included superficial femoral artery/popliteal (39%), tibial (54%), and pedal (7%). All grafts had a minimum diameter of 3mm. 57/66 grafts (86%) were patent at 30 days; 9 were lost to early follow-up. The only significant risk factor associated with 30-day failure was ABO mismatch [3/7 patients (43%) compared to 6/59 (10%)  $p=.046$ ]. Estimated primary patency was worse in the tibial/pedal group (27%) compared to those bypasses to SFA/Popliteal target (46%), see Figure 1. There were 20 (27%) major amputations, and all grafts in these limbs had occluded at the time of amputation. Of the 32 limbs with ischemic tissue loss who had long-term follow up, 16/32 (50%) went on to graft occlusion, 9/32 (28%) had a major amputation, and 23/32 (72%) had complete healing of the index wound.

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** The use of CSV for infrainguinal revascularization should be discouraged in patients with disabling claudication or rest pain. However, with an aggressive multidisciplinary approach including vigilant wound care and lack of autologous options, CSV may yield acceptable limb salvage. Avoiding ABO mismatch may improve 30-day graft patency.

### Primary Patency by Distal Target Revascularized



	<b>Number at Risk</b>					
		0	100	200	300	400
SFA/popliteal	29	19	11	9	9	
Tibial/pedal	46	22	13	8	6	

*Figure 1: Tibial/Pedal and SFA/Politeal Group Comparison*

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 20

### **Outcomes of Open and Endovascular Lower Extremity Revascularization in Current Smokers with Intermittent Claudication and Critical Limb Ischemia**

Author(s): Samuel L. Chen, MD, Matthew D. Whealon, MD, Nii-Kabu Kabutey, MD, Isabella J. Kuo, MD, Michael D. Sgroi, MD, Roy M. Fujitani, MD

Institution(s): University of California, Irvine Medical Center

**OBJECTIVE:** Active smoking is a frequent deterrent to perform elective lower extremity revascularization. In this study, we aimed to examine perioperative outcomes of endovascular lower extremity revascularization (LEE) and open lower extremity bypass (LEB) in active smokers with claudication or critical limb ischemia (CLI).

**METHODS:** Active smokers undergoing LEE or LEB from 2011-2014 were identified in the American College of Surgeons National Surgical Quality Improvement Program targeted vascular dataset. Patient demographics, comorbidities, anatomic features and perioperative outcomes were compared between LEE and LEB procedures. Subgroup analyses were then performed for patients undergoing revascularization for claudication versus CLI.

**RESULTS:** A total of 4,706 cases were identified, of which 1,497 were LEE (55.6% for CLI, 13.4% for below-knee (BK) pathology) and 3,209 were LEB (68.9% CLI, 34.7% BK). Patients undergoing LEE had higher rates of hypertension, end stage renal disease, and diabetes. LEE patients also had higher rates of prior percutaneous interventions (22.7% vs 17.2%) and pre-operative anti-platelet therapy (82.3% vs 78.7%). On risk-adjusted multivariate analysis, LEE had a higher need for re-intervention than LEB (AOR 1.52; 95% CI 1.08-2.13,  $P = .02$ ), however, had fewer wound complications (AOR 0.32; 95% CI 0.23-0.45,  $P < .01$ ). There were no statistically significant differences in 30-day mortality, MI or stroke, or major amputation between the two groups. In the claudication subgroup, the rate of MI or stroke was significantly lower in the LEE group compared to open bypass (AOR 0.17; 95% CI 0.03-0.83,  $P = .03$ ), though this difference was not found in the CLI subgroup. Additionally, while there was a trend towards less progression to major amputation among

## SCIENTIFIC SESSION ABSTRACTS continued

claudicants undergoing LEE, in patients with CLI, LEE appeared to confer a higher risk of amputation compared to open bypass. A summarized overview of the results can be found in Table 1.

**CONCLUSIONS:** In active smokers, open bypass carries with it higher rates of wound complications compared with endovascular procedures, though they require less re-interventions and have similar cardiovascular risk profiles. However, in claudicants undergoing endovascular revascularization, cardiovascular risk is significantly lower than open bypass, and should be considered when offering intervention.

Table1. Risk-Adjusted Outcomes of Endovascular Lower Extremity Revascularization versus Open Bypass in Active Smokers

Variable	Odds Ratio	95% Confidence Interval	P-Value
30-day mortality	0.444	0.154 - 1.282	.133
Claudication	--	- -	--
Critical Limb Ischemia	0.574	0.183 - 1.803	.342
Major Amputation	1.542	0.940 - 2.528	.086
Claudication	0.657	0.157 - 2.750	.565
Critical Limb Ischemia	1.583	0.931 - 2.691	.090
Major Re-intervention	1.518	1.080 - 2.134	.016
Claudication	2.034	1.012 - 4.087	.046
Critical Limb Ischemia	1.375	0.931 - 2.031	.110
Wound infection or complication	0.318	0.225 - 0.450	<.001
Claudication	0.226	0.111 - 0.459	<.001
Critical Limb Ischemia	0.364	0.243 - 0.543	<.001
MI or stroke	0.569	0.302 - 1.073	.081
Claudication	0.166	0.033 - 0.829	.029
Critical Limb Ischemia	0.748	0.369 - 1.519	.422

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 21

### **A VQI-Based Frailty Instrument Predicts 9-Month Postoperative Mortality**

Author(s): Larry W. Kraiss, MD<sup>1</sup>, Ragheed Al-Dulaimi, MD<sup>1</sup>, Angela P. Presson, PhD<sup>1</sup>, Shipra Arya, MD SM<sup>2</sup>, George K. Lee, MD<sup>3</sup>, Philip P. Goodney, MD MS<sup>4</sup>, Matthew Mell, MD<sup>3</sup>, Jason Johannig, MD MS<sup>5</sup>, Julie L. Beckstrom, RN MSN CCRC<sup>1</sup>, Benjamin S. Brooke, MD PhD<sup>1</sup>

Institution(s): <sup>1</sup>University of Utah, Salt Lake City, <sup>2</sup>Emory University, Atlanta, Ga. <sup>3</sup>Stanford University, Calif., <sup>4</sup>Dartmouth Medical School, Lebanon, N.H. <sup>5</sup>University of Nebraska, Omaha

**OBJECTIVE:** The Vascular Quality Initiative (VQI) collects data pertaining to frailty that in turn correlates with survival. We sought to develop and validate a VQI-based frailty instrument to predict longer term survival in patients undergoing vascular surgery.

**METHODS:** 214,762 cases of aortic repair, carotid intervention and lower extremity revascularization from 2010-2015 were analyzed. The following VQI data elements that map to established frailty domains were included in the model: HTN, CHF, CAD, DM, PAD, renal insufficiency, COPD, impaired ambulation, not living at home, anemia and underweight. Survival 9-months after surgery was determined using VQI follow-up and Social Security Death Index linkage. Regression models that assigned both equal and differential weights to each of the data elements were tested and validated using 10-fold cross-validation. A final model that incorporated the risk of each individual operation was also tested. Model predictability for 9-month mortality was analyzed by receiver-operating curves (AUC, area under the curve).

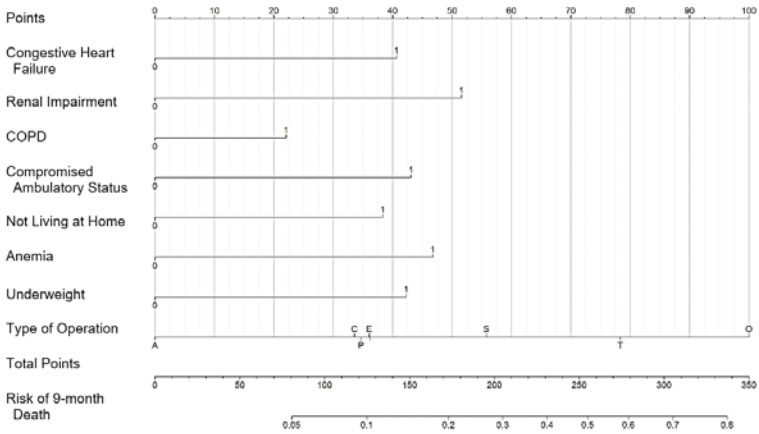
**RESULTS:** Vital status at 9-months was available for 179,722 operations. An equal-weighted frailty model incorporating all elements correlated well with 9-month mortality (AUC=0.70) but a model that assigned differential weights to each element based on strength of association with mortality performed better (AUC=0.76). Some classic comorbidities (HTN, DM, PAD, CAD) contributed little predictive power. A concise model excluding these variables but retaining the frailty domains (nutrition, social, physical function) performed just as well (AUC=0.76) [Figure]. Addition of procedure-specific mortality risk further improved model performance (AUC=0.77). The final

# SCIENTIFIC SESSION ABSTRACTS continued

model showed that open aortic procedures, TEVAR and renal insufficiency carried the greatest risk for 9-month mortality. A nomogram summing points for each frailty element and procedure-based risk allows estimation of 9-month mortality (Figure).

**CONCLUSIONS:** A model using only 7 VQI frailty-related data elements and procedure-based risk estimates 9-month mortality after arterial reconstruction. Frailty assessment may improve preoperative decision-making, especially when considering risk/benefit of procedures for claudication or asymptomatic pathology.

Figure 1: Nomogram for Predicting 9-month Mortality



- Renal Impairment (Cr >1.8, dialysis, transplant)
- Anemia (Female: Hgb <12; Male: Hgb <13)
- Underweight (BMI < 19)
- Type of Operation (A= CEA; C= carotidstent; P=peripheral vascular intervention; E=EVAR; I=open infra-inguinal bypass; S=open supra-inguinal bypass; T=TEVAR; O=open AAA)

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 22

### **Operative Results of Iliac Artery Endofibrosis in High-performance Athletes**

Author(s): Tiffany Wu, MD, Corenelius Olcott, IV, MD, Jason T. Lee, MD

Institution(s): Stanford University, Calif.

**OBJECTIVE:** Prior reports have documented excellent early results after surgery for external iliac endofibrosis (EIE) in cyclists. We sought to evaluate our own long-term functional outcomes in this select cohort of patients.

**METHODS:** Patients undergoing reconstruction for symptomatic iliac artery endofibrosis at a single institution from 2000-2015 were reviewed. With IRB approval, data were collected from medical record review and follow-up telephone interviews.

**RESULTS:** Eighteen patients (mean age 44, range 26-57), 8 males and 10 females, underwent operative intervention for iliac endofibrosis and/or kinking. All were high performance endurance athletes (cyclists, triathletes, marathon runners). Four patients had undergone previous operative repair(s) at other institutions. Four patients were found to have EIA occlusion at the time of presentation. Median drop in exercise ABI noted while cycling in the vascular lab was 0.72 (range 0.34-1.0) in the affected limb and 0.37 (range 0.13-0.52) on the contralateral side. Flexed positioning CT-A was used to confirm diagnosis in eleven patients. Surgical intervention included iliofemoral bypass (n=5), patch angioplasty (n=9), or arterial shortening procedure (n=4). Concomitant inguinal ligament release was performed in 72% of patients. Primary patency was 93% at 1 year and 82% at latest follow-up (mean follow-up 66 months, range 4-198). While 82% of patients were able to return to their prior level of physical endurance, in long-term follow-up survey 50% of these patients experienced some recurrence of symptoms.

**CONCLUSIONS:** External iliac artery endofibrosis is a rare disease seen primarily in high performance cyclists or triathletes. Cycling exercise ABIs and flexed positioning arteriography can be useful tools for confirming the diagnosis. Surgery remains a viable treatment option with acceptable patency rates and early short-term success; however, longer-term follow-up indicates relatively high symptom recurrence rates which should be discussed during preoperative consultation.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 23

### **Endovascular versus Open Bypass Surgery for TASC D Femoropopliteal Lesions in Patients with Critical Limb Ischemia**

Author(s): Jason T. Nieves, MD, Gagan Singh, MD, John Laird, MD, William Pevec, MD, Misty Humphries, MD

Institution(s): UC Davis Medical Center, Sacramento, Calif.

**OBJECTIVE:** The Trans-Atlantic Inter-Society Consensus II (TASC-II) recommendation for treatment of type D lesions of the femoral-popliteal arteries is surgical revascularization. However, more physicians utilize an “endovascular first” approach for these lesions, due to relatively recent advancements in technology and decreased procedural morbidity. The hypothesis is that endovascular interventions have comparable outcomes to surgical bypass for TASC II D lesions in patients with critical limb ischemia (CLI).

**METHODS:** A retrospective review was performed of all patients with CLI and infra-inguinal TASC II D lesions who underwent open or endovascular intervention at our institution between 2007 and 2015. The primary outcomes were limb events, defined as any re-intervention needed after the initial procedure, and major amputations (above the ankle). Kaplan Meier analysis was used to analyze the primary outcomes and mortality. The standard errors for the reported analyses were all <10%. Cox proportional hazards modeling was used to adjust for covariates.

**RESULTS:** Fifty patients and 61 limbs with CLI and infra-inguinal TASC D disease were identified. Open revascularization was performed on 30 limbs while 31 underwent endovascular treatment. The mean patient age was 72±13 year. There was a higher rate of end stage renal disease (10 vs. 0, p=0.008) and congestive heart failure (14 vs. 4, P<0.001) in the endovascular group. Mean follow up was 29 months (0.9-74 months). There was no difference in adjusted freedom from amputation at 40 months between the open and endovascular treatment groups (64 vs. 60% p=0.65), see Figure 2. Freedom from limb events also did not differ between patients with open vs. endovascular (26 vs. 35%, p=0.91) treatment, see Figure1. Adjusted mortality was significantly higher in patients with endovascular treatment (Endo= 34%, open= 49% , p= 0.002).

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** CLI patients with TASC-II type D lesions have similar rates of limb salvage and limb events after open or endovascular intervention, out to 40 months. Mortality was higher with endovascular interventions; this likely was due to greater comorbidities in this group. An endovascular-first approach does not seem to jeopardize long-term limb outcomes.

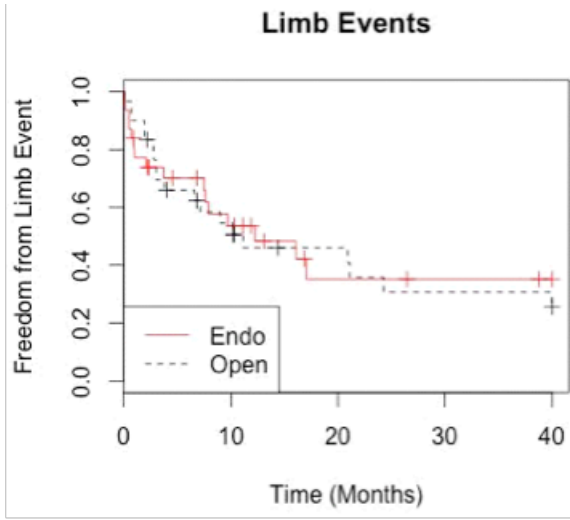


Figure 2: Comparison of Amputation Rates

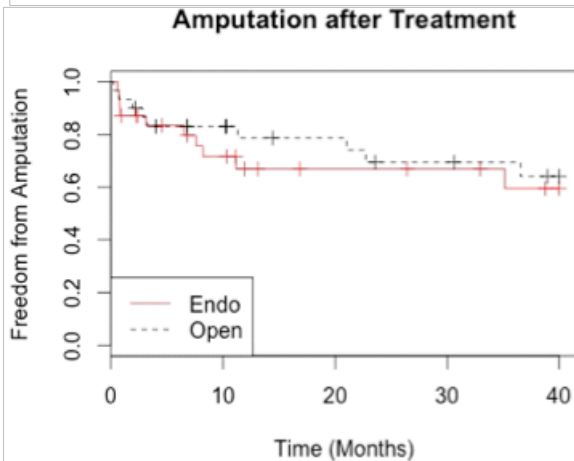


Figure 1: Comparison of Limb Events

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 24

### **Endovascular Repair of Extent II-IV Thoracoabdominal Aortic Aneurysms**

Author(s): Jason Faulds, MD, Jon Misskey, MD, Joel Gagnon, MD, Keith Baxter, MD, Jerry Chen, MD, Darren Klass, MD, Joel Price, MD, Michael Janusz, MD

Institution(s): University of British Columbia, Vancouver

**OBJECTIVES:** Open surgery provides a safe and durable reconstruction for patients with Extent II-IV thoracoabdominal aortic aneurysms. For patients unable to tolerate open repair due to physiologic risk, endovascular repair has been utilized. Pre-fabricated four branched endografts are available, and can be custom made or an off the shelf configuration. This report describes our initial experience with endovascular branched graft repair of Extent II-IV thoracoabdominal aortic aneurysms in patients unfit for open repair.

**METHODS:** Retrospective analysis of all patients undergoing endovascular treatment of extent II-IV thoracoabdominal aortic aneurysms. Pre-operative patient characteristics, as well as aneurysm etiology, size and extent were recorded. Endovascular graft configuration and number of branches were recorded. Intraoperative details and follow up to a mean of 22 months was available.

**RESULTS:** Twenty-two patients underwent endovascular repair of extent II (54.5%), III (18.8%) and IV (27.2%) thoracoabdominal aortic aneurysms from 2009 to 2015. Median age was 79 years and 14 patients (64%) were male. There were 2 ruptures (9.1%) with all other patients having elective repair. Chronic kidney disease, coronary artery disease and COPD were present in over 50% of the patient population. Graft configuration involved 4 branched devices in 18 (81.8%) and three branches in 4 (18.2%). Grafts were custom made in 10 patients and off the shelf in 12 patients. Three patients were treated with a planned perfusion branch. There were no intraoperative deaths and 3 patients (13.6%) died prior to discharge. There were 2 conversions to open repair and a single case of paraplegia. There were 11 (50%) patients with post-operative endoleak, of which 8 required an intervention. Seven patients (31.8%) were noted to have ongoing aneurysm sac enlargement on follow up imaging.

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSION:** Endovascular repair of extent II-IV thoracoabdominal aortic aneurysms provides a safe reconstruction in our group of elderly patients with significant co-morbidities. Endoleak remains a significant concern and ongoing surveillance to identify those with ongoing sac enlargement is critical.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 25

### **Usefulness of Four-Dimensional Flow Cardiac Magnetic Resonance for Evaluation of Aortic Dissection**

Author(s): Gregory Magee, MD<sup>1</sup>, Michal Schaefer, MS<sup>2</sup>, Ross Volpe, MS<sup>2</sup>, Adam Rocker, MS<sup>2</sup>, Ryan Arce, MS<sup>2</sup>, Kendall S. Hunter, PhD<sup>2</sup>, Omid Jazaeri, MD<sup>2</sup>

Institution(s): <sup>1</sup>University of Colorado, School of Medicine, Aurora, <sup>2</sup>University of Colorado, College of Engineering, Dept. of Bioengineering, Aurora

**OBJECTIVE:** Aortic remodeling is an essential prognostic factor in patients with aortic dissections. However, non-invasive in-situ flow/hemodynamic evaluation in the dissected aorta has yet to be characterized and implemented to pre-operative planning. The cardinal aortic pathological changes described by variance in luminal sizes, frequency and localization of fenestrations in the intimal flap, character of false lumen, and degree of thrombosis have been shown to have predictive outcomes. Hemodynamic indices such as wall shear stress (WSS) and oscillatory shear index (OSI) have been shown to be primary vascular mechanotransduction markers associated with the propensity toward thrombosis.

**METHODS:** 56 y.o. man with history of Stanford Type-A dissection and ascending aortic repair returns for follow-up. Computed tomographic angiography demonstrated a chronic dissection flap, and natural fenestration with aneurysmal degeneration of the infrarenal aorta. In order to plan staged endoluminal aortic repair, the patient underwent 4-dimensional flow encoding cardiac magnetic resonance (4D-Flow CMR) for macroscopic visualization and 3D quantification of aortic hemodynamics.

**RESULTS:** Velocity streamlines generated from 3-dimensional velocity vector fields (see Figure 1), allowed for qualitative evaluation of blood flow along the entire aorta. Their study revealed significant recirculation and vortex formation in the aortic arch. Flow hemodynamic analysis within the true and false lumen found decreased WSS and increased OSI in the false lumen suggesting potential for thrombosis of the false lumen. Further, flow profile analysis in distal false lumen revealed retrograde diastolic flow.

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Limited understanding of current interventional strategies, as well as heterogeneity in dissections, contributes to lack of consensus as to the most effective treatment modality for aortic repair in patients with thoracoabdominal pathology. Analysis of the variability in fluid dynamics, perfusion and wall stress can provide insights into treatment strategies and assessing response to medical, surgical or endoluminal interventions. This report introduces a novel and non-invasive model for investigating aortic dissection with regards to targeted therapies for patients with acute and chronic aortic dissection.

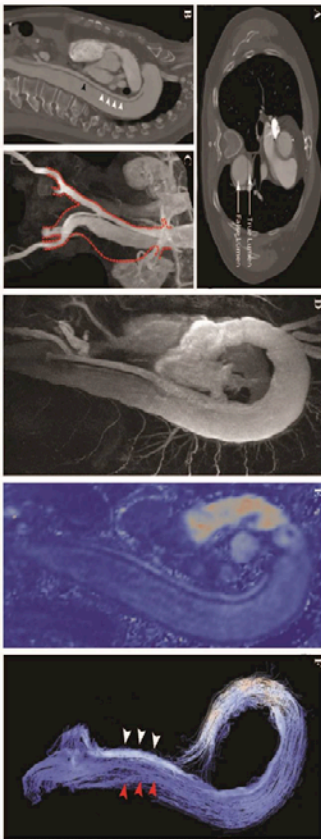


Figure 1: Title: Chronic Aortic Dissection and 4-D MR Aortic Blood Flow  
Panels A/B: CTA of the chest, abdomen and pelvis demonstrate a chronic dissection flap de-noted by white arrow heads, natural fenestration black arrow head, with aneurysmal degeneration of the infrarenal aorta. 4-D flow encoding magnetic resonance imaging for macroscopic visualization and 3D quantification of aortic hemodynamics.

Panels C, D and E: The sagittal oblique slice during systole (Panel E) reveals increased velocity of blood flow and wall stress within narrow true lumen. The reconstructed blood flow from generated 3D velocity vector field, shows streamlines in the dissected aorta and suggests the importance in assessing the variability in hemodynamics in primary and secondary flow fields as it pertains to perfusion of visceral vessels

Panels E and F: The true lumen (Panel F, white arrow heads) conducts high velocity flow when compared to the near stagnant and reversed flow in the false lumen (Red arrow heads).

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 26

### **Differences in Aortic Diameter Measurements with Intravascular Ultrasound and Computed Tomography after Blunt Traumatic Aortic Injury**

Author(s): Maria Ceja Rodriguez, B.A. in Biochemistry, Augustus Realyvasquez, MD, Joseph Galante, MD, William Pevec, MD, Misty Humphries, MD

Institution(s): University of California, Davis

**OBJECTIVE:** Intravascular ultrasound (IVUS) has been recommended as an adjunct to thoracic endovascular aortic repair (TEVAR), as Computed Tomography (CT) in injured patients with vasoconstriction due to shock may inaccurately determine the true aortic diameter. Hypothesis: CT underestimates aortic diameter in trauma patients, compared with IVUS.

**METHODS:** Patients treated by TEVAR for blunt aortic injury from June 2013 to 2016 were reviewed. Cases where IVUS was not used and those without complete CT and IVUS images were excluded. Three dimensional reconstructions were used to derive centerline diameters of the aorta proximal and distal to the injury. IVUS diameters were taken from adventitial measurements of the aorta. Measurements were made by an investigator blinded to the graft implanted. Descriptive statistics were used to compare patients with concordant diameter (group 1) to patients with discordant diameters (group 2).

**RESULTS:** A total of 24 blunt thoracic aortic injuries were repaired with TEVAR during the study period; complete data were available for 16. The mean age of the patients was 43 ( $\pm$  18 years) and 12 of the patients were men. The median time from injury to CT was 2.5 hours (IQR= 0.9-8.5) and to TEVAR was 18 hours (IQR= 3-48). Graft diameters chosen by CT and IVUS imaging were the same in five cases (group 1). In 11 cases, the graft diameters based on IVUS were 1 size larger than those determined by CT (group 2). There were no significant differences in the lowest systolic blood pressure (98 vs. 92  $p=0.53$ ), mean fluid resuscitation in the first 24 hours (4.9 vs. 5.0 L,  $p=0.97$ ), or 24-hour transfusion requirements (130 vs. 1311 ml,  $p=0.11$ ) between groups 1 and 2, respectively. In group 2, the graft size chosen for surgery correlated more with measurements obtained from the CT than from IVUS (9 vs. 2).

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** TEVAR has become the standard therapy for blunt aortic injury, despite a dearth of long-term outcome data. Pre-operative CT frequently underestimates aortic diameter, compared with intra-operative IVUS. As thoracic aortic diameters are known to increase with advancing age, the implications of this finding will be determined by future evaluations of late outcomes in this relatively young population.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 27

### **Endovascular Repair of Blunt Thoracic Aortic Injuries with the Zenith Alpha Thoracic Device: Updated Outcomes from the TRANSFIX Study**

Author(s): Benjamin W. Starnes, MD<sup>1</sup>, Amit Dwivedi, MD<sup>2</sup>, Joseph Giglia, MD<sup>3</sup>, Karen Woo, MD<sup>4</sup>, Chyon Yeh, PhD<sup>5</sup>

Institution(s): <sup>1</sup>Surgery, University of Washington, <sup>2</sup>University of Louisville, <sup>3</sup>University of Cincinnati, <sup>4</sup>University of Southern California, Los Angeles, <sup>5</sup>COOK Research Incorporated, Lafayette, Ind.

**OBJECTIVE:** The Zenith Alpha Thoracic Endovascular Graft (Cook Medical, Bloomington IN) was recently approved in the US for the treatment of blunt thoracic aortic injuries (BTAs). The aim of this update is to report longer term outcomes from the TRANSFIX study.

**METHODS:** This prospective, nonrandomized, single-arm, multicenter study enrolled 50 patients with grade II-IV BTAs (44 men and 6 women; mean age  $43 \pm 19$  years, range 18-89 years; mean Injury Severity Score  $31 \pm 14$ , range, 3-66) at 17 US sites between January 2013 and May 2014. Patients were treated with the Zenith Alpha Thoracic Endovascular Graft, which is available in smaller graft diameters (starting at 18 mm) and a lower profile delivery system (starting at 16 Fr), and accommodates a tighter aortic curvature (radius of 20 mm). Postoperative clinical and imaging follow-up was performed at 30 days, 6 months, 1 year, and annually thereafter through 5 years.

**RESULTS:** Mean study follow-up was approximately 21 months (633 days, range, 18-1050 days). One patient died within 30 days (not aortic injury-related) and 4 patients died after 30 days (1 related to aortic injury, due to an esophageal-aortic fistula; 3 unrelated). Freedom from all-cause mortality and aortic injury-related mortality at 1 year was 89.3% and 92.8%, respectively. Two cases of stroke occurred within 30 days, and no strokes were reported beyond 30 days. In total, 6 patients underwent reintervention for thrombus, device compression, residual injury, endoleak, dissection, and pseudoaneurysm. Only 1 patient underwent surgical conversion (181 days post-procedure) after a failed reintervention for a site-reported proximal type I endoleak. No patient experienced aortic rupture. Among 31 patients with available core laboratory review of CT imaging at 1 year, aortic injury healing (i.e., the absence of aortic

## SCIENTIFIC SESSION ABSTRACTS continued

injury) was confirmed in 96.8% (30/31) of patients and patency was observed in 100% (31/31) of patients. No type I or type III endoleak, component separation, device migration, or device integrity issues have been observed based on core laboratory imaging review to date.

**CONCLUSIONS:** Updated outcomes indicate that the Zenith Alpha Thoracic Endovascular Graft continues to perform safely and effectively for the treatment of BTAIs.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 28

### **Standard TEVAR Compared to PETTICOAT in Aortic Dissection**

Author(s): Kyle Arsenaault, MD, Darren Klass, MD, Joel Price, MD, Michael Janusz, MD, Joel Gagnon, MD, Jerry Chen, MD, Jason Faulds, MD

Institution(s): University of British Columbia, Vancouver

**OBJECTIVES:** The PETTICOAT (provisional extension to induce complete attachment) technique is a modification of TEVAR that utilizes a covered stent graft to exclude the proximal entry tear combined with bare metal stents to encourage true lumen perfusion and false lumen thrombosis. The effect of the PETTICOAT technique on aortic remodeling remaining unknown. The primary goal of this cohort study is to compare patients treated with standard TEVAR to those treated with PETTICOAT.

**METHODS:** Retrospective analysis of all patients undergoing endovascular treatment of type B dissections. Patients were separated into the PETTICOAT and standard TEVAR cohorts. Comparators included mortality, stroke, paraplegia, change in renal function and need for re-intervention. To determine the effect on aortic re-modeling we compared maximum aortic diameter, true and false lumen diameter and false lumen thrombosis. Continuous variables were analyzed using the Student's t-test or the Mann-Whitney U test, as appropriate. Categorical variables were analyzed with the chi-squared test.

**RESULTS:** Thirty-nine patients were identified who received TEVAR for aortic dissection, 23 formed the PETTICOAT cohort and 16 formed the TEVAR cohort. Baseline characteristics, aortic morphology and extent of dissection were similar between the groups. Mean length of follow-up was 1.1 years in the Petticoat group and 2.9 years in the TEVAR group. True lumen diameter at the point of maximum aortic diameter was significantly increased in both groups (19.7 vs. 31.6;  $p < 0.01$  for Petticoat; 21.0 vs. 34.5;  $p = 0.01$  for Non-Petticoat). At the diaphragmatic hiatus, the true lumen was significantly increased at follow-up for the Petticoat group (13.4 vs. 24.0;  $p < 0.01$ ) but not for the Non-Petticoat group (15.1 vs. 27.6;  $p = 0.30$ ). Twelve (52.2%) patients in the Petticoat group had thrombosis of the thoracic component of false lumen, compared to 10 (40.0%) in the Non-Petticoat group ( $p = 0.36$ ). A greater proportion of patients in the Petticoat group remained free from reintervention during follow-up.

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** We noted trends towards increased true lumen diameter and false lumen thrombosis in the PETTICOAT cohort compared to standard TEVAR. The overall complication rate was low with a single stroke reported and no cases of post-operative paraplegia.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 29

### **Female Gender is Not a Predictor for Worse Outcomes Following Carotid Interventions in the Community: A Report from Washington State's Vascular Interventional Surgical Care and Outcomes Assessment Program (VI-SCOAP)**

Author(s): Daiva Nevidomskyte, MD, Susanna Shin, MD, Gale Tang, MD, Thomas Hatsukami, MD, Felix Vladimir, MD, David R. Flum, MD, Mark H. Meissner, Sherene Shalhub, MD MPH

Institution(s): University of Washington, Seattle

**OBJECTIVES:** Data from large randomized carotid trials suggest that women have a higher risk of adverse events following carotid interventions. We hypothesized that a community based Washington state registry data would also reveal increased morbidity and mortality for women undergoing carotid interventions.

**METHODS:** VI-SCOAP is a statewide physician-led quality initiative that monitors performance by benchmarking processes of care and outcomes. Data were collected prospectively for consecutive patients undergoing carotid endarterectomy (CEA) or carotid artery stenting (CAS) at 19 hospitals in Washington State between 2010 and 2015. We compared demographics, presentation and 30-day outcomes between men and women.

**RESULTS:** A total of 3704 patients (mean age 70.6 + 9.9, 39.5% women, 90.1% white) underwent CEA (n= 2759) and CAS (n= 945). There was no difference in age, ethnicity, or pre-operative functional status between genders. Men were more likely to have coronary artery disease (46.5% vs 32.9%,  $p<0.01$ ). Women were more likely to smoke (30.1% vs 22.9%,  $p<0.01$ ). While there was no difference in use of CEA or CAS between men and women, a higher percentage of women underwent CEA for asymptomatic carotid disease (53.9% vs 48.1%,  $p<0.01$ ). The majority of CEAs were performed by vascular surgeons (86.9%) while the majority of CAS were performed by interventional radiologists (54.9%). Men and women had similar rates of post-operative stroke and myocardial infarction (MI), as detailed in Table 1, and were as likely to experience the composite end point of death, stroke or MI ( $p=0.32$ ). Death in symptomatic men (1.2%) following CEA contributed to the overall higher 30-

## SCIENTIFIC SESSION ABSTRACTS continued

day mortality compared to women (0.8% vs 0.1%,  $p=0.01$ ). Men and women had similar lengths of hospital stay and discharge disposition. Women were as likely to be discharged on antiplatelet therapy and beta-blocker, but less likely to receive statins (72.9% vs 76.8%,  $p<0.01$ ).

**CONCLUSIONS:** Contrary to our hypothesis and previous reports from large randomized data sets, women did not suffer increased morbidity or mortality following carotid interventions in this community-based analysis. This data derived from the real world clinical practice challenges the previous evidence that female gender is a risk factor for worse outcomes post carotid interventions.

Table 1. Thirty-day outcomes for men and women undergoing carotid endarterectomy (CEA) and carotid stenting (CAS)<sup>a</sup>

30-Day Events	Carotid Endarterectomy			Carotid Stenting		
	(n=2759)			(n=945)		
	Male (%) (n=1659)	Female (%) (n=1101)	P Value	Male (%) (n=583)	Female (%) (n=362)	P Value
Death	13 (0.8)	1 (0.1)	0.01	4 (0.7)	5 (1.4)	0.29
Stroke	20 (1.2)	13 (1.2)	0.95	11 (1.9)	8 (2.2)	0.90
MI	6 (0.4)	6 (0.5)	0.47	0	0	--
Death, Stroke, or MI	39 (2.4)	20 (1.8)	0.32	14 (2.4)	13 (1.4)	0.41

MI - Myocardial Infarction

<sup>a</sup>Events were defined as any event occurring intraoperatively, before discharge, or between discharge and 30-days

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 30

### **Optimizing Management for Mycotic Carotid Artery Blowouts in the Irradiated Neck**

Author(s): Samuel L. Chen, MD, Isabella J. Kuo, MD, Nii-Kabu Kabutey, MD, Roy M. Fujitani, MD

Institution(s): University of California, Irvine Medical Center

**OBJECTIVE:** Mycotic carotid pseudoaneurysms are rare, but often lethal complications in head-and-neck cancer patients with previous adjunctive neck irradiation. A management algorithm for patients presenting with catastrophic arterial bleeding from this entity is not clearly defined. A staged hybrid approach involving prompt angiography with temporizing endovascular intervention and evaluation for adequate intra-cerebral collaterals, followed by definitive carotid ligation or reconstruction during subsequent neck exploration may offer a more optimal management algorithm.

**METHODS:** We describe five consecutive cases of bleeding mycotic distal common carotid artery pseudoaneurysms in patients (4 male, 1 female) with prior neck irradiation and radical neck dissections for squamous cell carcinoma. All were managed with the proposed algorithm.

**RESULTS:** Mean age was 61.6 years (range 49-71). Time from most recent neck irradiation ranged from 2 months to 27 years. Four of these patients had associated pharyngo-cutaneous fistulae. All patients presented with significant oropharyngeal bleeding and underwent prompt catheter-based angiography. In three patients, endovascular coiling of the bleeding site was performed and in two patients, temporizing covered stents were placed. Three patients underwent balloon-occlusion testing and two had delayed-phase angiography demonstrating good flow bilaterally suggesting adequate collaterals. Four patients subsequently underwent carotid artery ligation, one of whom had a transient stroke. One patient with pre-existing contralateral carotid occlusion underwent carotid reconstruction with autogenous vein. Two had evidence of cancer recurrence in the adventitia of the artery upon resection. All patients had subsequent rotational myocutaneous flap coverage following carotid ligation or reconstruction. None had recurrent bleeding after this staged intervention.

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Bleeding mycotic carotid pseudoaneurysms presenting in a delayed fashion following prior neck irradiation for head-and-neck cancer can be successfully salvaged with an algorithm of diagnostic angiography, temporizing endovascular intervention and testing for sufficient collaterals to allow for carotid ligation or reconstruction at the time of ensuing neck exploration.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 31

### **VCAM-1 is a Promising Target to Identify High-risk Carotid Plaques Using Contrast-enhanced Duplex Ultrasound**

Author(s): Craig C. Weinkauf, MD, PhD<sup>1</sup>, Scott S. Berman, MD, MHA<sup>2</sup>, Kay Goshima, MD<sup>1</sup>, Luis R. Leon, MD<sup>3</sup>, Edmund R. Marinelli, PhD<sup>4</sup>, Rebecca Millius, MD<sup>1</sup>, Evan C. Unger, MD<sup>4</sup>

Institution(s): <sup>1</sup>University of Arizona, Tucson <sup>2</sup>Carondelet Heart and Vascular Institute Physicians, <sup>3</sup>Tucson Medical Center, <sup>4</sup>NuvOx Pharmaceuticals

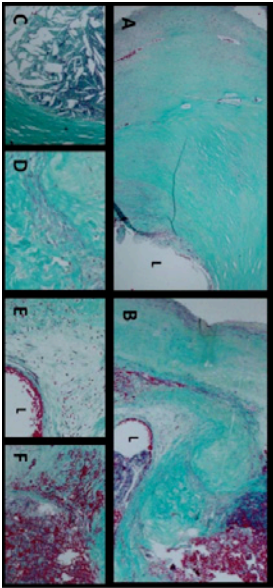
**OBJECTIVE:** Identify molecular targets expressed on high-risk carotid plaques that can be imaged with contrast enhanced ultrasound techniques in order to better risk-stratify patients for stroke who have asymptomatic carotid stenosis.

**METHODS:** Carotid plaques were collected in a consecutive order from asymptomatic (30) and symptomatic (30) patients who underwent carotid endarterectomy at multiple centers from 2014-2015. These plaques were processed for histological analysis (Fig. 1) and evaluated for differential expression of four candidate molecular targets by immunohistochemistry (IHC) (Fig. 2). Based on these data, unique peptides were synthesized and covalently linked to ultrasound contrast microbubbles that enables microbubble targeting to Vascular Cell Adhesion Molecule-1 (VCAM-1).

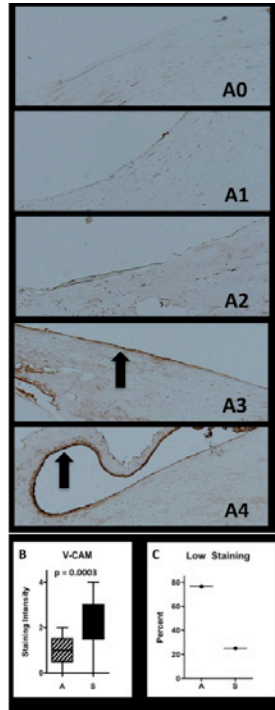
**RESULTS:** IHC revealed that the mean VCAM-1 expression on endothelium in carotid endarterectomy specimens from symptomatic patients is 2.4X that of asymptomatic patients ( $p = 0.0003$ ) (Fig. 2A, 2B). In contrast to this differential VCAM-1 expression, P-Selectin, vWF and LOX-1—additional molecules that play roles in carotid plaque evolution and acute inflammation—have similar expression in symptomatic versus asymptomatic plaques. Although the majority of plaques from asymptomatic patients have very low or no VCAM-1 expression, 23.5% have expression similar to that of plaques from symptomatic patients (Fig. 2C), which raises the possibility that these represent plaques from a subgroup of high-risk asymptomatic patients. Based on these data, we synthesized microbubble-linked peptides that specifically bind VCAM-1 for use in further mammalian experiments.

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** VCAM-1 has significantly higher expression on symptomatic carotid plaques compared to asymptomatic carotid plaques. Our data indicate that contrast enhanced ultrasound with microbubbles that target VCAM-1 is a strong candidate for detection of vulnerable carotid plaque. As such, this is a non-invasive technique that may help in risk-stratification of patients with asymptomatic carotid atherosclerosis for surgical intervention.



*Fig. 1: CEA Plaques have Differential Histology Features*  
Formalin fixed, de-calcified CEA plaques were evaluated with Trichrome staining by light microscopy (10X). Asymptomatic (A) plaques have low-risk features with uniform cholesterol-rich, calcified plaque (C). Symptomatic plaques (B) have a varying combination of high-risk features including LRNC (D), Inflammatory Infiltrate (E), and IPH (F). L = lumen



*Fig. 2: V-CAM Selectively Stains High-Risk Carotid Plaques*  
IHC staining of 30 asymptomatic (A) and 30 symptomatic (S) CEA plaques with Anti-VCAM (1:200) were blindly graded on a 0-4 scale. Staining is seen best along the endothelium (arrows). Grade 0 = minimal staining; grade 4 = highest staining, see A1-A4. Symptomatic plaques had significantly higher VCAM staining (B) compared to asymptomatic plaques, of which 76.5% had low VCAM staining (C) as defined as grade 0 or 1.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 32

### **Contemporary Outcomes of Elective Iliac Vein Stenting in Chronic Venous Occlusive Disease**

Author(s): Johnathon C. Rollo, MD, Steven Farley, MD, Adam Oskowitz, MD, Warren Chow, MD, Juan Carlos Jimenez, MD, MD, Brian Derubertis, MD

Institution(s): University of California, Los Angeles

**BACKGROUND:** Patients with chronic venous occlusive disease present with a spectrum of findings ranging from leg edema to severe non-healing ulceration and venous claudication. Angioplasty and iliac vein stenting has been shown to significantly improve clinical outcomes. Previous studies have included thrombotic and non-thrombotic lesions in analysis of outcomes in iliac vein stenting for chronic venous disease. Our objective is to evaluate our approach to recanalization and stenting in the treatment of thrombotic venous occlusive disease and report the outcomes.

**METHODS:** A prospectively maintained database was retrospectively reviewed. All patients with symptomatic thrombotic iliac vein lesions between 2008-2015 were analyzed. Non-thrombotic iliac vein lesions were excluded from analysis. Criteria for intervention included thrombotic stenosis or occlusion of the iliac vein or vena cava in the setting of symptomatic chronic venous disease CEAP 3 or greater. Presenting CEAP score, post-intervention CEAP score, primary and secondary patency, wound healing and clinical outcomes were recorded.

**RESULTS:** Of the 32 patients evaluated 38.7% had a hypercoagulable disorder, 67.7% were subscribed anticoagulation prior to intervention. Symptoms included pain/swelling (100%), venous claudication (80.7%), or CEAP class 3 (78%) class 4/5 (9%) class 6 (13%). All patients were presenting with either subacute (>30 days, 37.5%) or chronic (>90 days, 62.5%) thrombosis. Successful intervention was performed in 31 (97%) using angioplasty/stent with adjunctive lysis in 62.5%. Overall clinical improvement occurred in 87.5% and a decrease in CEAP score in 65.4%. Complete clinical resolution was obtained in 46.8% of all patients. Healing of ulceration occurred in 60% of patients with a median heal time of 3 months (compared to 12mo median preop). Complications included 3 early re-occlusions, and no mortality or PE, or clinically significant

## SCIENTIFIC SESSION ABSTRACTS continued

hematoma. Primary and secondary 1-year patency was 64% and 71% overall (mean follow-up 14.7 months).

**CONCLUSIONS:** Treatment of chronic venous occlusive disease with iliac vein stenting is associated with excellent 1-year patency rates, healing of venous ulcers and a significant reduction in symptoms and CEAP score.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 33

### **Vascular Surgery: An Essential Hospital Resource in Modern Healthcare**

Author(s): Miguel F. Manzur, MD, Sung W. Ham, MD, Ramsey S. Elsayed, MD, Trevor Simcox, BS<sup>2</sup>, Fred A. Weaver, MD

Institution(s): Keck School of Medicine of USC, Los Angeles, Calif.

**OBJECTIVES:** Vascular surgeons are consulted by other surgical specialties for intraoperative vascular exposure, reconstruction, or hemorrhage control. These requests occur both electively and emergently. We analyzed the value of vascular surgery operative services as a resource to other surgical specialties at our institution.

**METHODS:** Intraoperative elective and emergent vascular surgery consultations requiring operative intervention were reviewed over a 3-year period (2013-2016). Patient demographics, requesting surgical specialty, indication and type of vascular operative intervention, and work relative value units (wRVUs) generated for the intervention were recorded.

**RESULTS:** Seventy-six patient's required vascular surgery intraoperative consultations requiring operative intervention. Operative interventions were emergent in 57% and elective in 43%. Most common elective intervention was oncologic vascular reconstruction while the most common emergency intervention was hemorrhage control during oncologic resection. Vascular beds included the lower extremity (35%), aorta and its major branches (33%), IVC and major venous structures (19%), vessels of the head and neck (7%), and the upper extremity (6%). Requesting surgical specialties were: cardiac (24%), urology (18%), orthopaedics (17%), hepatobiliary/transplant (16%), and others (25%). Reasons for consultation were vascular reconstruction (30%), dissection requiring vascular exposure (21%), hemorrhage control (20%), acute limb ischemia (15%), and access difficulties (14%). The types of repairs were primary vessel repair (32%), interposition grafts (28%), bypass (21%), and others (19%). Ninety-nine percent (75/76) of cases were completed after vascular assistance. In-hospital mortality was 10.5% (8/76), none related to vascular intervention. Mean wRVUs generated per vascular surgery intervention was 22.3.

## SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** The availability of vascular surgeons ensures the successful completion of technically challenging operations performed by other surgical specialties. Furthermore, intraoperative vascular surgery services are frequent in both elective and emergent settings and involve a variety of vascular beds. Vascular Surgery is an essential hospital resource in the modern healthcare environment.

## SCIENTIFIC SESSION ABSTRACTS continued

Presentation 34

### **Determinants of Mid-term Functional Outcomes and Wound Healing in a Hospital-Based Limb Preservation Program**

Author(s): Bala Ramanan, MD, Ayman Ahmed, MBBS, Bian Wu, MD, Marlin W. Causey, MD, Warren J. Gasper, MD, Shant M. Vartanian, MD, Jade S. Hiramoto, MD, Michael S. Conte, MD

Institution(s): Vascular Surgery, University of California San Francisco

**OBJECTIVES:** To assess mid-term functional status, wound healing and in-hospital resource utilization among a prospective cohort of patients treated in a tertiary hospital, multidisciplinary center for limb preservation (CLP).

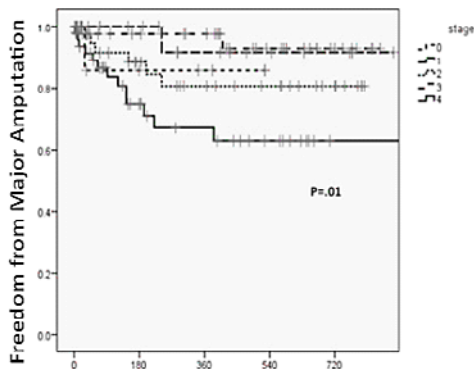
**METHODS:** Data were prospectively gathered on all consecutive admissions to the CLP from July 2013 to October 2014. Limbs were staged using the SVS (WIFI) classification scheme at the time of hospital admission. Acute limb ischemia patients were excluded.

**RESULTS:** The cohort included 135 patients with 165 threatened limbs; mean age (+ SD) was 66 (+ 13) years and median follow up duration (IQR) was 389 (78-634) days. During the index admission, 71% of limbs underwent revascularization. Fifty patients (37%) were readmitted at least once, half of which occurred within 30 days of discharge. Mean total number of re-admissions per patient (+SD) was 0.67+1.12, with cumulative length of stay (cLOS) of 14.7 (+16) days. During follow-up, 23% of limbs required a vascular re-intervention, and 44% developed recurrent wounds. There was no difference in the rate of readmission, vascular re-intervention or wound recurrence by initial WIFI stage ( $P > .05$ ). At the end of the study period, 74 patients (55%) were ambulatory, 34 (25%) were non-ambulatory (wheelchair bound or bedridden); in 20%, functional status was missing. On univariate analysis, end stage renal disease, wound grade, hindfoot lesions, initial endovascular revascularization and higher PREVENT III risk category were associated with non-ambulatory status ( $P < .05$ ). On multivariate analysis, no factor independently predicted functional outcome. Initial WIFI stage was associated with major amputation ( $P = .03$ ), amputation free survival (AFS) ( $P = .01$ ; Figure 1), and cLOS ( $p = .01$ ), but not with time to wound healing or ambulatory status (Table 1).

# SCIENTIFIC SESSION ABSTRACTS continued

**CONCLUSIONS:** Patients admitted for treatment of limb threat have a significant rate of readmission and cLOS during mid-term follow-up. Initial Wifl stage is predictive of cLOS and mid-term AFS but not ambulatory functional status, time to wound healing, or index limb wound recurrence. Stage 4 patients incur significantly greater in-hospital care. Predictors of long-term functional status are needed to optimize patient selection and establish meaningful goals for shared decision-making.

**Fig. 1: Amputation Free Survival**



**Patients at Risk**

<b>Stage 1</b>	20	20	9	6	4
<b>Stage 2</b>	46	24	18	14	7
<b>Stage 3</b>	40	30	26	15	6
<b>Stage 4</b>	48	22	16	10	2

Wifl stage	1 (N=20) N (%)	2 (N=46) N (%)	3 (N=40) N (%)	4 (N=48) N (%)	P-value
Major Amputation	1 (5%)	6 (13%)	2 (5%)	13 (27%)	.03
Percentage of patients with amputation free survival	92%	81%	93%	63%	.01
Median time to foot healing, days	58	55	130	116	.72
Cumulative LOS in days (mean +/- SD)	13 (+/-11)	14 (+/-14)	10 (+/-7)	22 (+/-24)	.01
Ambulatory functional status	11 (79%)	28 (80%)	17 (63%)	15 (58%)	.23

## POSTER PRESENTATION ABSTRACTS

Poster Presentation 1

### **Readmission after Open Abdominal Aortic Aneurysm Repair: Consider Prioritizing Triage to Teaching Hospitals**

Author(s): Madhukar S. Patel, MD, MBA, ScM<sup>1</sup>, Zhi Ven Fong, MD<sup>1</sup>, Abraham Noorbakhsh<sup>2</sup>, Brandon M. Wojcik, MD<sup>1</sup>, Samuel E. Wilson, MD<sup>3</sup>, David C. Chang, PhD, MPH, MBA<sup>1</sup>

Institution(s): <sup>1</sup>Massachusetts General Hospital, Boston <sup>2</sup>University of California, San Diego, La Jolla <sup>3</sup>University of California, Irvine

**OBJECTIVE:** Readmission after abdominal aortic aneurysm (AAA) repair to a different (non-index) hospital has been shown to be associated with higher mortality rates, possibly due to challenges with coordination of inter-hospital handoff. It is unknown, however, if it is possible to ameliorate this effect. The objective of this study was to determine the impact of hospital teaching status on non-index hospital readmission and mortality.

**METHODS:** An observational analysis of the longitudinally linked California Office of Statewide Health Planning and Development (OSHPD) database was conducted from 1995-2009. Patients who were readmitted within 30 days after open AAA repair were included. The main outcome measure studied was mortality upon readmission.

**RESULTS:** Over the 15-year study period, 3667 AAA readmissions were analyzed, of which 1811 (49.3%) were readmitted to a non-index hospital and 1254 (34.1%) were readmitted to a hospital with a different teaching status. There was 0% mortality upon readmission for patients readmitted to teaching hospitals, regardless of whether the readmission hospital was the index hospital or a non-index hospital. This was significantly different from those readmitted to non-teaching hospitals, where the mortality rate was 4.8% for index readmission versus 8.1% for non-index readmission ( $p=0.004$ ); this difference persisted on adjusted analysis (OR 1.79, 95% CI 1.20-2.68).

**CONCLUSIONS:** After open aneurysm repair, readmission to a different hospital is associated with a higher mortality rate, but this increased risk is eliminated if the readmission occurs at a teaching hospital. Consideration should thus be given for triage of these patients to teaching hospitals where the

## POSTER PRESENTATION ABSTRACTS continued

advantage may be related to availability of 24-hour in house surgical presence, and emergency surgical teams equipped to handle both unfamiliar patients as well as those who may be at high risk for mortality upon readmission. Communication at a high level between the index hospital and readmission hospital is essential.

## POSTER PRESENTATION ABSTRACTS continued

Poster Presentation 2

### **Gender Differences in Arteriovenous Fistula Surgical Site Selection and Maturation Time**

Author(s): Timothy Y. Liu, MD, Eyun J. Song, MD, Rishad M. Faruqi, MD, Sami Mazbar, MD, James C. Tang, MD, Bradley B. Hill, MD

Institution(s): Kaiser Permanente Santa Clara Medical Center, Calif.

**OBJECTIVE:** Larger vein diameter and upper arm placement of arteriovenous fistulas (AVFs) are associated with greater primary functional patency and shorter maturation times. This study examined the impact of gender on the primary functional patency and maturation times.

**METHODS:** Patients undergoing primary AVF placement at our medical center (2007-2013) were divided by gender and evaluated retrospectively. Those with prior permanent access, no vein mapping, or kidney transplant were excluded. We analyzed for gender differences in various demographic, clinical, laboratory, radiographic, and operative factors (eg, upper vs lower arm AVF; one- vs two-stage procedures). Outcome variables were primary functional patency (ie, successful dialysis use without needing intervention) and median maturation time (ie, number of days until the AVF was deemed ready for use by the vascular surgeon).

**RESULTS:** Among 108 patients in the analysis (66% male), there was no difference between genders in age (66.1 years for males vs 68.8 years for females;  $P = .30$ ) or ethnicity ( $P = .81$ ). Among medical comorbidities and laboratory values, the only significant differences between genders were prevalence of cancer and smoking (Table). At the anastomosis site, there was no gender difference in arterial diameters ( $3.76 \pm 1.21$  cm vs  $3.65 \pm 0.92$  cm;  $P = .59$ ) or vein diameters ( $3.57 \pm 1.10$  cm vs  $3.62 \pm 1.10$  cm;  $P = .81$ ). Male patients had significantly fewer upper arm AVFs (47% vs 73%;  $P = .009$ ) and two-stage procedures (11% vs 30%;  $P = .03$ ). There was no difference between genders in primary functional patency (65% vs 51%;  $P = .18$ ), but there was a significant difference in median maturation time (109 days for males vs 164 days for females;  $P = .017$ ).

## POSTER PRESENTATION ABSTRACTS continued

**CONCLUSIONS:** In patients receiving their first native AVF, there was no difference between genders in the anastomotic vessel sizes or primary AVF functional patency. This was likely due to a higher number of upper arm AVFs in females because of their smaller vessel sizes overall. However, time to maturation was significantly shorter in males, which was likely caused by a higher number of two-stage procedures in females. Therefore, patient gender should play a role in deciding when a patient is referred for access placement, given the longer time to maturation in women compared to men.

Gender differences in medical comorbidities			
	Male (n = 71)	Female (n = 37)	P-value
Hypertension	69 (97%)	37 (100%)	.30
Hyperlipidemia	65 (92%)	35 (95%)	.57
Diabetes	51 (72%)	25 (68%)	.65
Coronary Artery Disease	27 (38%)	9 (24%)	.15
Heart Failure	17 (24%)	10 (27%)	.73
Atrial Fibrillation	9 (13%)	5 (14%)	.90
Stroke	14 (20%)	3 (8%)	.12
Peripheral Vascular Disease	13 (18%)	4 (11%)	.31
Cancer	6 (8%)	11 (30%)	.004
Smoking	44 (62%)	12 (33%)	.005
Obesity	30 (42%)	18 (49%)	.53

## POSTER PRESENTATION ABSTRACTS continued

Poster Presentation 3

### **Strokes Rates with TransCarotid Artery Revascularization with High-Rate Flow Reversal Embolic Protection are comparable with Standard Risk Carotid Endarterectomy**

Author(s): Mazin I. Foteh, MD<sup>1</sup>, Wesley S. Moore, MD<sup>2</sup>

Institution(s): <sup>1</sup>Cardiothoracic and Vascular Surgeons, Austin, Texas, <sup>2</sup>UCLA Medical Center, Los Angeles, Calif.

**OBJECTIVE:** Carotid endarterectomy and carotid artery stenting have shown comparable long-term durability in contemporaneous randomized trials of standard surgical risk patients. The ACT 1 and CREST trials recently reported 5 and 10-year data respectively. However, CAS still carries twice the periprocedural stroke risk of CEA in ACT 1 (2.8% vs. 1.4%;  $p=0.23$ ) in a standard risk, asymptomatic population which excluded octogenarians. TransCarotid Artery Revascularization with high-rate flow reversal embolic protection using the ENROUTE Transcarotid Neuroprotection System was deemed safe and effective in the FDA, multi-center ROADSTER IDE trial in a high surgical risk cohort that included symptomatic patients with no age restriction.

**METHODS:** The ROADSTER trial was prospective, single-arm, multicenter clinical trial was performed to evaluate the use of the ENROUTE Transcarotid NPS during CAS procedures performed in patients considered to be at high risk for complications from CEA. Symptomatic patients with  $\geq 50\%$  stenosis and asymptomatic patients with  $\geq 70\%$  stenosis were eligible to be treated. The primary end point was a composite of all stroke (S), myocardial infarction (MI), and death (D) at 30 days post-procedure. Secondary end points included cranial nerve injury and 30-day stroke, death, stroke/death, and MI. All major adverse events were adjudicated by an independent clinical events committee.

**RESULTS:** From Nov 2012 and July 2014, 141 pivotal patients were enrolled at 18 sites. Mean age was 72.9 years and 34.8% were female. Symptomatic subjects comprised 25.5% of the enrollment. The rate of the composite endpoint (S/D/MI) was 3.5% in the ITT cohort and 2.9% in the PP cohort. The stroke rate in the ITT cohort was 1.4% (2 of 141) and 0.7% in the PP cohort (1/136). There were no strokes in patients age  $\geq 75$  or age  $\geq 80$ . In addition, there were

## POSTER PRESENTATION ABSTRACTS continued

no strokes in symptomatic patients. There were no major strokes or permanent cranial nerve injury.

**CONCLUSIONS:** The ROADSTER study demonstrates that TCAR can achieve periprocedural stroke rates in symptomatic and asymptomatic patients at high risk for complications from surgery that are comparable to the periprocedural stroke rate in asymptomatic CEA patients at standard risk for complications from surgery. TCAR can be done with less comorbidities like permanent cranial nerve injury.

## POSTER PRESENTATION ABSTRACTS continued

Poster Presentation 4

### **Smoking Habits of Patients Undergoing Treatment for Intermittent Claudication in The Vascular Quality Initiative**

Author(s): Joshua Gabel, MD, Brice Jabo, MD, M.P.H., Sharon Kiang, MD, Sheela Patel, MD, Christian Bianchi, MD, Jason Chiriano, DO, Theodore Teruya, MD, Ahmed M. Abou-Zamzam, Jr., MD

Institution(s): Loma Linda University, Calif.

**OBJECTIVE:** SVS practice guidelines for the medical treatment of intermittent claudication (IC) give a GRADE 1A recommendation for smoking cessation. The decision to intervene for IC is complex and the threshold for intervention ill-defined. The Vascular Quality Initiative (VQI) national database was reviewed to evaluate the relationship between smoking status and interventions performed for IC.

**METHODS:** The VQI registries for infra-inguinal bypass (IB), supra-inguinal bypass (SB) and peripheral vascular intervention (PVI) were analyzed to identify patients who underwent invasive treatment for IC. Patient factors, procedure type (open [IB+SB], endo [PVI]), and level of disease (supra-, infra-inguinal) were evaluated for association with smoking status (never, former, current) by uni- and co-variate analysis.

**RESULTS:** Between 2010-2015, 101,055 procedures were entered in the three registries, with 40,269 (40%) performed for IC. Complete data for analysis was present in 37,632 cases (SB 3,020; IB 5,333, PVI 29,279). At the time of intervention, 44% of patients were active smokers, with wide variation by region (16%-53%). In co-variate analysis, active smoking at treatment was associated with age <70 (RR 2.42), male gender (RR 1.03), COPD (RR 1.35), the absence of prior cardiovascular procedures (RR 1.15), poor medication usage (RR 1.10), pre-op ABI<0.9 (RR 1.19) and supra-inguinal disease (RR 1.16). Endo vs open procedure was not significantly associated with smoking status (Table). During follow-up 36% of patients quit smoking. Predictors of smoking cessation included age =70 (RR 1.45, 95% CI,1.21-1.74), ABI =0.9 (RR 1.12, 95% CI, 1.00-1.25), and open procedure (RR 1.22, 95% CI, 1.12 -1.33).

## POSTER PRESENTATION ABSTRACTS continued

**CONCLUSIONS:** Of patients undergoing intervention for IC in the VQI, 44% were active smokers with wide regional variation. The threshold for intervention in active smokers was lower in the presence of younger age, fewer co-morbidities, lower ABI, and supra-inguinal disease, but was not affected by the invasiveness of treatment. Elderly patients and those undergoing open procedures were more likely to quit smoking during follow up. These findings provide great insight into current treatment approaches to IC in the VQI and suggest opportunities for greater smoking cessation efforts prior to invasive therapies for IC.

Covariate	RR	95%	CI
Age <70	2.42	2.32	2.53
Male	1.03	1.00	1.06
No prior cardiovascular procedure: (CABG/PCI, Bypass, CEA/CAS, PVI)	1.15	1.12	1.19
HTN	0.89	0.86	0.92
CAD	1.00	0.97	1.04
CHF	0.83	0.78	0.88
COPD	1.35	1.31	1.39
DM	0.91	0.89	0.93
Dialysis	0.66	0.56	0.78
Obese	0.81	0.78	0.83
No Pre-Op Antiplatelet + Statin	1.10	1.06	1.12
ABI <0.9	1.19	1.14	1.24
Disease Level			
Supra	1.16	1.14	1.05
Infra	1.00		
Procedure Type			
Endo	1.02	0.98	1.05
Open	1.00		

## POSTER PRESENTATION ABSTRACTS continued

Poster Presentation 5

### **Epidural Analgesia Is Less Effective for VA Patients Than Community Practice Patients After Open Aortic Surgery**

Author(s): Anna H. Ohlsson, MD<sup>1</sup>, Shanley B. Deal, MD<sup>2</sup>,  
Gabriel A. Wallace, MD<sup>1</sup>, Derek P. Nathan, MD<sup>2</sup>, Gale L. Tang, MD<sup>1,3</sup>

Institution(s): <sup>1</sup>University of Washington, Seattle <sup>2</sup>Virginia Mason, Seattle, Wash. <sup>3</sup>VA PSHCS, Seattle, Wash.

**OBJECTIVE:** To test the effectiveness of epidural analgesia after open aortic surgery in a VA population compared to a community teaching practice.

**METHODS:** This is a retrospective analysis of 253 patients who underwent open aortic surgery between 2007 and 2013 at the VA Puget Sound Health Care System (n=155) or Virginia Mason Medical Center (n=98). Patients were categorized into three groups for the primary endpoint: patient-controlled analgesia alone (PCA), successful epidural, or inadequate epidural (defined as the need for a supplemental PCA). Secondary endpoints included total IV morphine equivalents (ME) and subjective pain scores over the first three post-operative days. Groups were compared using student's t-test and Z-score using  $P < .05$  as significant.

**RESULTS:** VA patients undergoing open aortic surgery were significantly more likely to have an inadequate epidural (78%) than community practice patients (25%,  $P < .001$ ). For PCA alone, VA patients used a similar amount of ME ( $194 \pm 153$  vs  $298 \pm 375$ ,  $P = .35$ ) and had similar pain scores ( $4.3 \pm 2.6$  vs  $3.2 \pm 2.5$ ,  $P = .22$ ). For successful epidural, VA patients used significantly less ME than community practice patients ( $95 \pm 74$  vs  $724 \pm 1478$ ,  $P < .001$ ), but had higher median pain scores ( $3.0 \pm 1.9$  vs  $1.8 \pm 1.3$ ,  $P < .01$ ). For inadequate epidurals, VA patients used significantly less ME than community practice patients ( $210 \pm 182$  vs  $424 \pm 391$ ,  $P = .02$ ), but trended towards higher median pain scores ( $4.0 \pm 1.8$  vs  $3.3 \pm 1.7$ ,  $P = 0.1$ ). VA patients were more likely to have a history of preoperative narcotic use (25% vs 4%,  $P < 0.01$ ), and those patients were more likely to have an inadequate epidural (23% vs 4%,  $P = .03$ ). The rate of preoperative narcotic use in community practice was similar amongst patients with successful and inadequate epidurals (3% vs 5%,  $P = \text{NS}$ ).

## POSTER PRESENTATION ABSTRACTS continued

**CONCLUSIONS:** Epidurals were significantly less effective in a VA patient population after open aortic surgery than in a community teaching practice. This difference likely is secondary to a higher concentration of narcotic used in the community practice epidural formulation, leading to more effective pain control and less need for a supplemental PCA.

## POSTER PRESENTATION ABSTRACTS continued

Poster Presentation 6

### **Predictors of Poor Outcomes in Type B Aortic Dissection Repair.**

Author(s): Robert J. Beaulieu, MD<sup>1</sup>, Caitlin W. Hicks, MD<sup>1</sup>, Michael Bronsert, PhD., M.S.<sup>2</sup>, Mark R. Nehler, MD<sup>2</sup>, T Brett Reece, MD<sup>2</sup>, James H. Black, III, MD<sup>1</sup>, Natalia O. Glebova, MD, PhD<sup>2</sup>

Institution(s): <sup>1</sup>Johns Hopkins Hospital, Baltimore, Md., <sup>2</sup>University of Colorado Denver, Aurora

**OBJECTIVE:** Treatment of type B aortic dissection (TBAD) remains challenging, and real world outcomes in patients who are high-risk surgical candidates remain to be elucidated. We sought to characterize predictors of poor outcomes after open or endovascular repair in TBAD in a national database.

**METHODS:** 2005-2014 ACS NSQIP database was queried for patients with TBAD undergoing open or endovascular repair; aneurysm repairs were excluded. Univariable, bivariable, and multivariable logistic regression analyses were used to determine risk factors for 30-day postoperative mortality, renal failure requiring dialysis, and stroke. Chi-squared test was used for parametric and t-test for continuous variables. Variables with univariate  $p < 0.2$  were included for multivariate analysis. Model fit was assessed using Akaike information criterion.

**RESULTS:** Of 883 identified patients, 150 (17%) underwent open and 733 (83%) endovascular repair. Patients in endovascular cohort were older (63 vs 59 years,  $p < .001$ ) and more likely to undergo emergent operation (33 vs 23%,  $p = .017$ ) than patients in open cohort. Other comorbidities were similar. Most patients were ASA class 4/5 (endovascular, 60 vs open, 65%,  $p = .304$ ). Despite a higher preoperative creatinine in endovascular group (1.5 vs 1.1 mg/dL,  $p = .008$ ), postoperative renal failure requiring dialysis was less frequent than with open repair (3 vs 15%,  $p < .001$ ). Mortality (9 vs 13%,  $p = .104$ ) and stroke (5 vs. 7%,  $p = .512$ ) rates were similar. Composite endpoint of dialysis dependence, stroke, or death was less frequent among endovascular vs. open cohort (15 vs 29%,  $p < .001$ ). In multivariate analysis, repair type and ASA class were independent predictors of postoperative renal failure (C-index 0.719). Repair type, ASA class, and preoperative renal failure were independent predictors of composite endpoint (C-index 0.679).

## POSTER PRESENTATION ABSTRACTS continued

**CONCLUSIONS:** Renal complications dominate poor outcomes after open surgery for TBAD, even among patients with normal baseline renal function. Patients with TBAD are frequently poor operative candidates (ASA class 4/5). While 30-day mortality is similar despite repair type, endovascular therapy is associated with a greatly reduced incidence of renal failure and should be considered as first line therapy in patients with appropriate anatomy.

## POSTER PRESENTATION ABSTRACTS continued

Poster Presentation 7

### **Infection Is Driving Factor in Progression of Forefoot Diabetic Ulcers to Major Lower Extremity Amputation**

Author(s): Sheena Harris, MD, Nasibeh Vatankhah, MD, Dale Wilson, MD, Erica Mitchell, MD, Gregory Moneta, MD, Amir-Farzin Azarbal, MD

Institution(s): Oregon Health & Science University, Portland

**OBJECTIVE:** Plantar forefoot diabetic foot ulcers (DFU) are common and demonstrate potential for healing if provided with early specialist care. Contemporary classification of DFU uses categories based on wound extent, ischemia, and infection (WIFI). Our objective is to identify when DFUs receive specialist care at our institution and which WIFI factor is most associated with progression to minor or major lower extremity amputation.

**METHODS:** We performed a retrospective review at a single institution of all patients with isolated plantar forefoot DFUs seen by vascular surgeons 2007-2014. Main outcome measures included amputation, ulcer healing, time to specialist (vascular or podiatry) consult, WIFI classification, extent of peripheral arterial disease, and patient demographics.

**RESULTS:** 77 limbs from 64 patients were included. 12% progressed to major amputation (above knee or below knee), 64% to minor amputations (toe or metatarsal-level), and 21% were documented as closed or healed. Average time to ulcer healing was 1.2 years (SD 1.15). Average time to specialist consult was 30 days (SD 99.4). DFUs progressing to minor amputation had more severe wounds compared to those who healed ( $1.16 \pm 0.06$  v  $0.94 \pm 0.06$ ,  $P=0.015$ ). Infection severity as measured by WIFI classification was significantly associated with major amputation ( $2.00 \pm 0.38$  v  $1.02 \pm 0.14$ ,  $P=0.041$ ). There was no difference in ABIs, gender, HA1c, or dialysis dependence between patients progressing to minor or major amputation compared to those who heal.

**CONCLUSIONS:** Most patients with DFU progress to minor or major lower extremity amputations. Progression of plantar forefoot DFU to MLEA is most strongly associated with degree of wound infection. We recommend early consultation to prevent infection of DFUs and progression to MLEA.

## POSTER PRESENTATION ABSTRACTS continued

Table 1: Patient Risk Factors	
	Patients (%)
Risk Factors	N = 64
Female	16 (25%)
Male	48 (75%)
Average HbA1c (mmol/mol)	8.89
Dialysis	12 (19%)
Smoking (ever)	12 (19%)

Table 2: Ulcer Characteristics	
	Ulcers (%)
Characteristics	N = 77
Minor amputation	49 (64%)
Metatarsal head amputation	25 (51%)
Toe amputation	24 (49%)
Major amputation	9 (12%)
Documented healed ulcers	16 (21%)
Average time to healing	1.2 years
Average ABI	1.02
Average TBI	0.59
Revascularization	12 (16%)
Open	10 (83%)
Endovascular	3 (17%)

## POSTER PRESENTATION ABSTRACTS continued

Poster Presentation 8

### **Factors Predicting Successful Limb Salvage After Extremity Vascular Injury**

Author(s): Shahram Aarabi, MD MPH, Yasaman Kavousi, MD, Eileen Bulger, MD, Elina Quiroga, MD, Nam T. Tran, MD, Benjamin W. Starnes, MD, Niten Singh, MD

Institution(s): University of Washington, Seattle

**OBJECTIVE:** Extremity vascular trauma requires prompt repair to ensure successful limb salvage. Modern limb salvage success has improved, but is still associated with high complication and secondary amputation rates. We review data from our level 1 trauma center to identify factors that predict successful limb salvage.

**METHODS:** A retrospective review of all trauma patients >18 years of age admitted to our institution with extremity injury requiring revascularization between April 2011 and October 2014. Data sources included medical, trauma registry, and financial records. Regression analyses were performed to evaluate risk factors with need for amputation, length of stay, number of procedures, and hospitalization cost.

**RESULTS:** A total of 48 patients were identified (mean age 37 years, range 18-87 years). 85% of patients were male, 54% had penetrating mechanism of trauma, and median ISS was 14. Primary vascular repair was performed in 45%, interposition graft in 28%, and bypass in 28% of patients. Of the 48 extremity injuries, 39 (81%) were ultimately salvaged and 9 (19% vs. 59% in 1990) required secondary amputation. Greater than 6 hours of ischemia time, transfer after revascularization at an outside hospital, complex revascularization (i.e. bypass), and popliteal artery injury showed statistically significant correlation with failure of limb salvage. For amputated patients, definitive amputation occurred at a range of 1 to 16 days after injury (median 3.5 days). Patients who failed attempts at limb salvage spent greater time in the hospital (mean +4.4 days), had a greater number of operations (mean +1.3) and total procedures (mean +4.9) performed. There was a trend towards higher hospitalization costs in failed limb salvage patients (mean \$83,085) compared to successful limb salvage patients (mean \$57,428).

## POSTER PRESENTATION ABSTRACTS continued

**CONCLUSION:** Limb salvage after extremity trauma with arterial injury has improved over time. Repair at a non-level 1 trauma center, prolonged ischemia time, and popliteal artery injury all correlated with failure of limb salvage. Patients with unsuccessful limb salvage were burdened with longer, costlier hospitalizations and multiple operations. Vascular trauma is best dealt with expeditiously at trauma centers with experience managing these injuries.

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# 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*

# MEMBER UPDATE FORM

Help the WVS keep your membership information current. We require an email address from all members for communication purposes, as well as your preferred mailing address.

Please return completed form to the WVS Registration Desk or fax to the Administrative Office at 360-261-6077 or email at [surgicalcs@gmail.com](mailto:surgicalcs@gmail.com).

## MEMBER INFORMATION (REQUIRED FOR ALL MEMBERS)

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NAME

---

INSTITUTION

CITY

STATE

---

EMAIL ADDRESS

## MAILING INFORMATION

Preferred Mailing Address:  Work  Home

Please provide preferred mailing address below:

---

MAILING ADDRESS

---

MAILING ADDRESS CONTINUED

---

CITY

STATE

POSTAL CODE

COUNTRY

---

DAYTIME TELEPHONE

**Thank you!**

## CONTACT INFORMATION



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# NOTES

# NOTES

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Western Vascular Society would like to thank  
the following exhibiting companies for their support  
of this educational program:

**Platinum**

**Abbott Vascular  
Cook Medical  
Gore & Associates  
Medtronic Inc.**

**Silver**

**Bard Peripheral Vascular  
Bolton Medical  
Boston Scientific  
Cryolife  
Endologix, Inc.  
Getinge Group  
LeMaitre Vascular  
Lombard Medical, Inc.  
Shire  
Silk Road Medical**