



WESTERN VASCULAR SOCIETY

35th Annual Meeting

September 27 – 29, 2020

VIRTUAL MEETING

www.westernvascularsociety.org

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OFFICERS AND COMMITTEES

OFFICERS

Benjamin W. Starnes, MD _____ President
Michael Conte, MD _____ President-Elect
York N. Hsiang, MB, MHSc _____ Past President
E. John Harris, MD _____ Past President
Steven Katz, MD _____ Past President
Roy Fujitani, MD _____ Secretary-Treasurer
Ahmed Abou-Zamzam, MD _____ Incoming Secretary-Treasurer
Matthew Mell, MD _____ Recorder

PROGRAM COMMITTEE

Vincent Rowe, MD _____ Chair
Omid Jazaeri, MD
Venita Chandra, MD
Elina Quiroga, MD
Benjamin W. Starnes, MD _____ President (Ex-Officio)
Michael Conte, MD _____ President-Elect (Ex-Officio)
Roy Fujitani MD _____ Secretary-Treasurer (Ex-Officio)
Mathew Mell, MD _____ Recorder (Ex-Officio)

MEMBERSHIP COMMITTEE

Sherene Shalhub, MD _____ Chairperson
Ali Azzizadeh, MD
Timothy Liem, MD
Roy Fujitani, MD _____ Secretary-Treasurer (Ex-Officio)

WVS REPRESENTATIVE TO THE SVS

Roy Fujitani, MD

LOCAL ARRANGEMENTS COMMITTEE

David Rigberg, 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
2016	Colorado Springs, CO	William Pevce, MD
2017	Blaine, WA	Steven Katz, MD
2018	Santa Fe, NM	E. John Harris, MD
2019	Wailea, HI	York N. Hsiang, MB, MHSc

SECRETARY-TREASURERS

1986 - 1990	Wesley S. Moore, MD
1990 - 1993	J. Dennis Baker, MD
1993 - 1996	P. Michael McCart, MD
1996 - 1999	Gregory L. Moneta, MD
1999 - 2000	Terence M. Quigley, MD
2000 - 2002	Julie A. Freischlag, MD
2002 - 2005	Jeffrey L. Ballard, MD
2005 - 2008	Joseph L. Mills, MD
2008 - 2011	Larry W. Kraiss, MD
2011 - 2014	E. John Harris, Jr., MD
2014 - 2017	York N. Hsiang, MB, MHSc
2017 - 2020	Roy Fujitani, MD
2020 - 2023	Ahmed Abou-Zamzam, MD

RECORDERS

1987 - 1989	Victor M. Bernhard, MD
1989 - 1992	Eugene F. Bernstein, MD
1992 - 1995	Peter F. Lawrence, MD
1995 - 1998	William C. Krupski, MD
1998 - 2001	Roy L. Tawes, MD
2001 - 2004	Ronald L. Dalman, MD
2004 - 2007	Peter A. Schneider, MD
2007 - 2010	William C. Pevec, MD
2010 - 2013	Steven Katz, MD
2013 - 2016	Benjamin W. Starnes, MD
2016 - 2019	Michael Conte, MD
2019 - 2022	Matthew Mell, MD

NEW MEMBERS ELECTED IN 2019

LeAnn Chavez, MD

Leighann O'Banion, MD

David Kauvar, MD

Adam Oskowitz, MD

Sharon Kiang, MD

Michael Peterson, MD (*Adjunct*)

Marcus Kret, MD

Alan Turroch, MD

Greg Magee, MD

Ehab Sorial, MD

Jenny Lee, MD

WVS PRESIDENTIAL GUEST LECTURERS

1986	Emerick Szilagyi	2004	None
1987	None	2005	Kevin G. Burnand
1988	James Stanley	2006	Jean Pierre Becquemin
1989	Brian Thiele	2007	None
1990	Frank Veith	2008	John H. N. Wolfe
1991	Allan Callow	2009	Jack L. Cronenwett
1992	Malcolm Perry	2010	None
1993	Norman Hertzner	2011	Germano Melissano
1994	Norman Browse	2012	Roy K. Greenberg
1995	Calvin Ernst		Hazim J. Safi
1996	Anthony Whittemore	2013	Spence M. Taylor
1997	None	2014	Alan B. Lumsden
1998	None	2015	Peter Glociczki
1999	Jonathan Towne	2016	Alik Farber
2000	R. Thomas Grayston	2017	Bruce Perler
2001	William Hiatt	2018	Thomas Wakefield
2002	Thomas R. Russell	2019	Thomas Forbes
2003	None	2020	Gustavo Oderich

GENERAL INFORMATION

EDUCATIONAL OBJECTIVES & METHODS

The 35th Annual Meeting of the Western Vascular Society was established with the specific purpose of advancing the art and science of vascular surgery, a goal that directly addresses competence, practice performance, and patient outcomes. The majority of the educational content includes scientific presentations by members, sponsored guests, and residents, selected by the WVS Program Committee.

OVERALL LEARNING OBJECTIVES

This activity is designed for: vascular surgeons, fellows, residents, and general surgeons who find the art and science of vascular surgery rapidly changing with respect to scientific discovery and surgical technology.

Reflecting this rapid advancement, the meeting will feature oral scientific presentations by members, sponsored guests, and residents.

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

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

GENERAL INFORMATION continued

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

EDUCATIONAL METHODS

Authored papers are supported by PowerPoint presentations or ePoster sessions. Full papers have a primary discussant and ample time provided for questions and discussion from the audience. Panel and group discussions are encouraged using the Zoom platform.

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



In support of improving patient care, this activity has been planned and implemented by Amedco LLC and Western Vascular Society. Amedco LLC is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

Credit Designation Statement

Amedco LLC designates this live activity for a maximum of **15.25 AMA PRA Category 1 Credits™**. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Satisfactory Completion

Learners must complete an evaluation form to receive a certificate of completion. Your chosen sessions must be attended in their entirety. Partial credit of individual sessions is not available.

INSTRUCTIONS FOR CME CREDIT COLLECTION

To claim the **15.25** *AMA PRA Category 1 Credits™*: To be eligible for the credits you, must log into the app and watch the presentations and complete the self assessment and complete the evaluation that is emailed to you.

To claim the **9.25** credits for Self-Assessment please check your email for the link to the online self assessment quiz and complete the quiz within 10 days of the program.

Alternatively, you can visit the website www.westernvascularsociety.org and find the links on the annual meeting page.

SPONSOR ACKNOWLEDGEMENT

Western Vascular Society is grateful to the following companies for their support of the 35th Western Vascular Society Annual Meeting.

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Western Vascular Society is grateful for the educational grant support from the following companies:

Abbott Vascular

Gore & Associates

INSTRUCTIONS TO AUTHORS

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

FULL PRESENTATIONS

10 minutes presentation, 2 minutes invited discussion,
8 minutes moderated questions

MINI PRESENTATIONS

4 minutes presentation, 6 minutes moderated questions

POSTER PRESENTATIONS

3 minutes presentation, 2 minutes moderated questions

ROBERT HYE MEMORIAL BEST RESIDENT PRESENTATIONS

8 minutes presentation, 2 minutes invited discussant

INVITED DISCUSSION

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

INSTRUCTIONS TO AUTHORS *continued*

MANUSCRIPTS

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

The guidelines for submission of your Manuscript(s) may be found on the Journal of Vascular Surgery Publications website www.editorialmanager.com/jvs. Please refer to the “Instructions for Authors.” Once the manuscript is submitted to the Journal by email, please send a confirmation of submission to Matthew Mell, MD, at mwmell@ucdavis.edu.



SCIENTIFIC PROGRAM



Denotes Hye Resident Award
Competition Eligible



Denotes Mini
Presentation



Denotes Founders Award
Competition Eligible

SUNDAY, SEPTEMBER 27, 2020

7:45 – 8:00 AM

CALL TO ORDER & ANNOUNCEMENTS

8:00 – 9:30 AM

SCIENTIFIC SESSION I – Aortic

Moderators: Benjamin W. Starnes, MD, President

Matthew Mell, MD, Recorder



8:00 – 8:20

1. Preoperative Risk Score Accuracy is Confirmed in a Modern Ruptured Abdominal Aortic Aneurysm Experience

Jake F. Hemingway, MD, *University of Washington*

Invited Discussant: Ali Azzizadeh, MD



8:20 – 8:40

2. The Natural History of Large Abdominal Aortic Aneurysms in Patients Without Timely Repair: Implications for Rupture and Mortality

Elizabeth M. Lancaster, MD, *University of California, San Francisco*

Invited Discussant: Andrew Barleben, MD

8:40 – 9:00

3. Towards Endovascular Treatment of Type A Aortic Dissection: Smaller Landing Zones, More Patient Eligibility

Andrew David Wisneski, MD, *University of California, San Francisco*

Invited Discussant: Jason Lee, MD

9:00 – 9:20

4. Aortic Neck Dilation Following Repair of Juxtarenal Aneurysms with Fenestrated Endovascular Aneurysm Repair

Sara L. Zettervall, MD, *University of Washington*

Invited Discussant: Omid Jazaeri, MD

9:20 – 9:30*

5. Changes in Transfer and Mortality Rates Following Western Vascular Society Guideline Publication for the Management of Ruptured Abdominal Aortic Aneurysms

Elizabeth L. George, MD, *Stanford University*



Denotes Hye Resident Award Competition Eligible



Denotes Mini Presentation



Denotes Founders Award Competition Eligible

9:30 – 10:00 AM

COFFEE BREAK WITH COOK MEDICAL
**Utility of a Disease Specific Approach to TBAD –
 Real-World Application and Key Takeaways**

Sukgu Han, MD

Timing is Everything – Management in Acute/Subacute Phase

William Yoon, MD

Importance of Seal Zone

Stephan Haulon, MD, PhD

Benefit of the BMS (vs TEVAR alone), EU Experience

10:00 – 11:00 AM

PRESIDENTIAL GUEST LECTURER

Gustavo Oderich, MD

11:00 – 12:30 PM

SCIENTIFIC SESSION II

Moderators: Benjamin W. Starnes, MD, Venita Chandra, MD



11:00 – 11:20

**6. Factors Influencing Medical Student Choices in the
 2020 Integrated Vascular Surgery Match: Implications
 for the Upcoming 2021 Covid-19 Affected Match**

Arash Fereydooni, MD, *Stanford University*

Invited Discussant: Erica Leith Mitchell, MD



11:20 – 11:40

**7. Understanding Value and Patient Complexity Among
 Common Inpatient Vascular Surgery Procedures**

Joel L. Ramirez, MD, *University of California, San Francisco*

Invited Discussant: Benjamin Brooke, MD



11:40 – 12:00

**8. Contemporary Outcomes of Traumatic Popliteal Artery
 Injury Repair**

Leigh Ann O'Banion, MD, *University of California SF- Fresno*

Invited Discussant: Elina Quiroga, MD



Denotes Hye Resident Award
 Competition Eligible

* Denotes Mini
 Presentation



Denotes Founders Award
 Competition Eligible

12:00 – 12:10*

9. Growth Rates of Small Abdominal Aortic Aneurysms (AAA) Identified in a Contemporary Practice

Eugene S. Lee, MD, Sacramento VA

12:10 – 12:20*

10. Contemporary Experience with Paravisceral Aortic Aneurysm Repair in an Experienced Endovascular Center

Devin S. Zarkowsky, MD, *University of Colorado*

12:20 – 12:30*

11. Complex Aortic Neck Anatomy does not Predict 30-day Mortality Following Ruptured Abdominal Aortic Aneurysm Repair

Bryce French, MD, *University of Washington*

12:30 – 12:40*

12. Predictors of Sac Regression and Mortality After Fenestrated Endovascular Aneurysm Repair (f-EVAR)

Jordan Stern, MD, *Stanford University*

12:40 – 1:40 PM

ASK THE PROFESSOR

Speakers: Gustavo Oderich, MD and Benjamin Starnes, MD

Moderator: Vincent Rowe, MD

2:00 – 5:00 PM

VIRTUAL GOLF TOURNAMENT

5:00 – 6:10 PM

E-POSTER SESSION

Moderator: Vincent Rowe, MD

5:00 – 5:05PM

P1. Diagnosis of Silent Coronary Ischemia with Selective Coronary Revascularization May Improve Survival of Patients with Critical Limb Threatening Ischemia

Dainis Krievins, MD, PhD, *Pauls Stradins Clinical University Hospital*

5:05 – 5:10

P2. Role of Intraplaque Lipids in Plaque Vulnerability Among DiabeticsWei Zhou, MD, *University of Arizona*

5:10 – 5:15

P3. Prophylactic Perigraft Arterial Sac Embolization During EVAR: Minimizing Type II Endoleaks and Improving Sac RegressionAsma Mathlouthi, MD, *University of California, San Diego*

5:15 – 5:20

P4. Proteomic Analysis of Descending Thoracic Aortic Aneurysms and Dissections to Identify Biomarkers for Surgical ManagementSarah J. Parker, PhD, *Cedars Sinai Medical Center*

5:20 – 5:25

P5. Analysis of Traumatic Vertebral Artery Injury Outcomes: Medical Management is Safe Despite Severity of InjurySharon C. Kiang, MD, *Loma Linda University Medical Center*

5:25 – 5:30

P6. Novel Technique for Access in Severely Calcified Vessels: Clamp-less “Gated” AnastomosisHarish Krishnamoorthi, MD, *Oregon Health and Science University*

5:30 – 5:35

P7. Predictive Factors of Cannula-Associated Limb Ischemia (CALI) in Venoarterial Extracorporeal Membrane Oxygenation (VA-ECMO) PatientsRobin B. Osofsky, MD, *University of New Mexico School of Medicine*

5:35 – 5:40

P8. Do Integrated Residency-trained Vascular Surgeons Limit the Scope of Their Practice with Respect to Patient Comorbidity? A Comparison of Residency and Fellowship Graduates’ Case Mix in the Vascular Quality Initiative RegistryIan Schlieder, DO, *University of Utah*Denotes Hye Resident Award
Competition Eligible* Denotes Mini
PresentationDenotes Founders Award
Competition Eligible

5:40 – 5:45

**P9. Vascular Care Delivery During the Covid-19 Pandemic:
Impact of the Office-based Lab and Ambulatory Surgery Center**Scott S. Berman, MD, *Pima Heart and Vascular*

5:45 – 5:50

**P10. Medical Management of Blunt Thoracic Aortic Injury:
Outcomes and Practice Patterns From the Aortic Trauma
Foundation Global Registry**Cassra Arbabi, MD, *Cedars-Sinai Medical Center*

5:50 – 5:55

**P11. Long-term Patency of the Un-stented Superior Mesenteric
Artery In Fenestrated Endovascular Aortic Aneurysm Repair
is Excellent**Thoetphum Benyakorn, MD, *University of Washington*

5:55 – 6:00

**P12. Increased Mortality in Octogenarians Undergoing
Endovascular Aortic Aneurysm Repair for Smaller Aneurysms
Warrants Caution**William Q. Duong, MD, *University of California, Irvine*

6:00 – 6:05

**P13. Network Meta-analysis of Drug-coated Balloon
Angioplasty Versus Primary Nitinol Stenting for
Femoropopliteal Atherosclerotic Disease**Sherwin Abdoli, MD, *Huntington Memorial Hospital***6:05 – 7:30 PM****MEDTRONIC WOMEN IN VASCULAR SURGERY INITIATIVE
ZOOM FORUMS**

Regional Vascular Surgery Interest Group

Women in Surgery Interest Group

MONDAY, SEPTEMBER 28, 2020

7:30 – 7:40 AM

WELCOME AND ORIENTATION

7:40 – 9:00 AM

SCIENTIFIC SESSION III

Moderators: Benjamin Starnes, MD and Omid Jazaeri, MD

7:40 – 7:50*

13. Early Ankle Brachial Index Testing is Associated with Decreased Risk of Amputation for Patients with Lower Extremity UlcersAngela Aguirre, BS, *University of California Davis*

7:50 – 8:00*

14. Medicaid Expansion and Lower Extremity Amputation Among Urban and Rural Beneficiaries with Chronic Limb-threatening IschemiaCaronae M. Howell, MD, *University of Arizona* 8:00 – 8:20**15. Propensity Score Matched Analysis of One Year Outcomes of Transcarotid Revascularization with Dynamic Flow Reversal, Carotid Endarterectomy and Transfemoral Carotid Artery Stenting**Mahmoud B. Malas, MD, *University of California San Diego*

Invited Discussant: Jonathon Rollo, MD

 8:20 – 8:40**16. The Natural History of Moderate Carotid Artery Stenosis in a Large Community-Based Cohort and Implications for Carotid Surveillance Among Asymptomatic Individuals**Rebecca C. Gologorsky, MD, *University of California- East Bay*

Invited Discussant: Niren Angle, MD

 Denotes Hye Resident Award Competition Eligible

* Denotes Mini Presentation

 Denotes Founders Award Competition Eligible

8:40 – 9:00

17. Economic Value of Podiatry Service in a Limb Salvage Alliance

Wei Zhou, MD, *University of Arizona*

Invited Discussant: Nikil Kansal, MD

9:00 — 9:20 AM

COFFEE BREAK WITH EXHIBIT PASSPORT QUEST

9:20 – 10:20 AM

PRESIDENTIAL ADDRESS

Benjamin W. Starnes, MD

10:20 – 10:50 AM

SCIENTIFIC SESSION IV

Moderators: Michael Conte, MD, and Elina Quiroga, MD

10:20 – 10:30*

18. Familial Risk of Abdominal Aortic Aneurysm and Implications for Population Screening

Claire L. Griffin, MD, *University of Utah*

10:30 – 10:40*

19. Gender Disparities in Presentation, Operative Characteristics, and Clinical Outcomes After Lower Extremity Bypass for Peripheral Artery Disease

Elizabeth M. Lancaster, MD, *University of California, San Francisco*

10:40 – 10:50*

20. Impact of Perioperative Blood Transfusion in Anemic Patients Undergoing Infra-inguinal Bypass

Cali E. Johnson, MD, *University of Southern California*



Denotes Hye Resident Award
Competition Eligible

* Denotes Mini
Presentation



Denotes Founders Award
Competition Eligible

10:50 – 11:10AM

COFFEE BREAK WITH TERUMO

The New Treo Abdominal Stent-Graft Introduction to the Western Vascular Society by Terumo Aortic

7 minute rapid-fire presentations

Moderator: Donald Jacobs, MD**Treo Endograft and Aortic Sac Shrinkage**Michael Stoner, MD (*Rochester, NY*)**Early Clinical Cases with Treo Abdominal Stent-Graft**Mazin Foteh, MD (*Austin, TX*)**Treo for Fenestrated EVAR: Experience and Outcomes**Benjamin Starnes, MD (*Seattle, WA*)

11:10 – 12:30PM

SCIENTIFIC SESSION V

Moderators: Michael Conte, MD, and Roy Fujitani, MD

11:10 – 11:20*

21. Evaluation of a Novel Hydrogel Intravascular Embolization Agent in a Swine Model of Fatal Uncontrolled Solid Organ Hemorrhage and CoagulopathyDavid S. Kauvar, MD, *Brooke Army Medical Center*

11:20 – 11:40

22. A Comparison of Outcomes Between Open and Endovascular Arteriovenous Access Creation for HemodialysisAlexa Mordhorst, MD, *University of British Columbia*

Invited Discussant: Shant Vartanian, MD

11:40 – 12:00

23. Safety and Efficacy of Robotic First Rib Resection with Adjuvant Endovascular Therapy for Venous Thoracic Outlet SyndromeAlejandro Zulbaran, MD, *Baylor College of Medicine*

Invited Discussant: Hugh Gelabert, MD



Denotes Hye Resident Award Competition Eligible



Denotes Mini Presentation



Denotes Founders Award Competition Eligible



12:00 – 12:20

24. Preoperative Thrombolysis Affords Significant Benefit in Patency and Outcome Following First Rib Resection in Acute Paget-Schroetter Syndrome (PSS)

Tristen T. Chun, MD, *UCLA Medical Center*

Invited Discussant: Misty Humphries, MD

12:20 – 12:30*

25. Early Recognition of Venous Ulcer Improves Healing Rates and Resource Utilization

Misaki Kiguchi, MD, *MedStar Washington Hospital Center*

12:30 – 1:30 PM

GETTY VIRTUAL MUSEUM GROUP TOUR

6:00 – 7:00 PM

PAST PRESIDENT'S HAPPY HOUR

Invitation Only



Denotes Hye Resident Award
Competition Eligible



Denotes Mini
Presentation



Denotes Founders Award
Competition Eligible

TUESDAY, SEPTEMBER 29, 2020

7:00 – 7:30 AM

GORE SPONSORED BREAKFAST SYMPOSIUM

Achieving Optimal TEVAR Positioning Advantages and Learnings with the GORE® TAG® Conformable Stent Graft with ACTIVE CONTROL System

Speaker: Sukgu Han, MD,

Moderator: Olsen Horton, PhD

7:30 – 9:10 AM

SCIENTIFIC SESSION VI – PAD

Moderators: Michael Conte, MD, and Matthew Mell, MD



7:30 – 7:50

26. Outcomes of Endovascular-first VS Bypass-first Approach for Patients with Chronic Limb-threatening Ischemia Using a Medicare-linked Database

Asma Mathlouthi, MD, *University of California, San Diego*

Invited Discussant: Nii-Kabu Kabutey, MD

7:50 – 8:00*

27. Center-level Variability in Management and Intervention for Claudication in the Veterans Health Administration

Elizabeth L. George, MD, *Stanford University*



8:00 – 8:20

28. The Global Limb Anatomic Staging System (GLASS) Predicts Clinical Outcomes in Chronic Limb Threatening Ischemia

Rym El Khoury, MD, *University of California, San Francisco*

Invited Discussant: Sharon Kiang, MD

8:20 – 8:30*

29. Peripheral Artery Disease is Associated with Lower Extremity Vascular Interventions and Death After Renal Transplant

Iris H. Liu, BA, *University of California, San Francisco*



Denotes Hye Resident Award Competition Eligible

* Denotes Mini Presentation



Denotes Founders Award Competition Eligible



8:30 – 8:50

30. A Single Center’s 15-Year Experience with Palliative Limb Care for Critical Limb Ischemia in Frail Patients

Agustin Sibona, MD, *Loma Linda University*

Invited Discussant: JC Jimenez, MD

8:50 – 9:10

31. Endovascular Therapy for CLTI Patients with Chronically Occluded Bypass Yield Similar Long-term Outcomes as De-novo Endovascular Recanalization

Alejandro Zulbaran, MD, *Baylor College of Medicine*

Invited Discussant: Warren Gasper, MD

9:10 – 9:30 AM

COFFEE BREAK WITH ABBOTT VASCULAR PANEL DISCUSSION

9:30 – 11:00 AM

SCIENTIFIC SESSION VII –

Moderators: Michael Conte, MD and Ahmed Abou-Zamzam, MD



9:30 – 9:50

32. Early Real-World Comparison of Ellipsys Percutaneous Arteriovenous Fistulas to Surgically-Created Fistulas

Robin B. Osofsky, MD, *University of New Mexico*

Invited Discussant: Karen Woo, MD

9:50 – 10:10

33. Treatment of Superficial Venous Reflux in CEAP 6 Patients: A Comparison of Cyanoacrylate Glue and Radiofrequency Ablation Techniques

Leigh Ann A. O’Banion, MD, *University of California San Francisco-Fresno*

Invited Discussant: Nasim Hedayati, MD



Denotes Hye Resident Award Competition Eligible



Denotes Mini Presentation



Denotes Founders Award Competition Eligible



10:10 – 10:30

34. Pedal Arterial Calcification Score Correlates with Risk of Major Amputation in Chronic Limb Threatening IschemiaIris H. Liu, BA, *University of California, San Francisco*

Invited Discussant: Venita Chandra, MD

10:30 – 10:40*

35. Influence of Thoracic Endovascular Aortic Repair on True Lumen Helical Morphology for Stanford Type B DissectionsJohan Bondesson, MS, *Stanford University*

10:40 – 10:50*

36. Management Strategy for Lower Extremity Malperfusion Due to Acute Aortic DissectionAnastasia Plotkin, MD, *University of Southern California*

10:50 – 11:00*

37. Respiratory-induced Changes in Reno-visceral Branch Vessel Morphology Following Fenestrated Thoraco-abdominal Aneurysm Repair with a Flexible Balloon Expandable Covered StentKenneth Tran, MD, *Stanford University***11:00 AM****AWARDS AND MEETING ADJOURNS**Denotes Hye Resident Award
Competition EligibleDenotes Mini
PresentationDenotes Founders Award
Competition Eligible

NOTES



SCIENTIFIC SESSION ABSTRACTS

SCIENTIFIC SESSION ABSTRACTS

1. Preoperative Risk Score Accuracy is Confirmed in a Modern Ruptured Abdominal Aortic Aneurysm Experience

Jake F. Hemingway¹, Bryce French¹, Michael Caps², Thoetphum Benyakorn¹, Elina Quiroga¹, Nam Tran¹, Niten Singh¹, Benjamin W. Starnes¹. ¹University of Washington, Seattle, WA, USA, ²Kaiser Permanente, Honolulu, HI, USA.

Objective: Various risk score calculators predicting 30-day mortality following the treatment for ruptured abdominal aortic aneurysms (rAAA) have produced mixed results with regard to usefulness and reproducibility. We sought to prospectively validate the accuracy of our preoperative scoring system in a modern cohort of rAAA patients.

Methods: A retrospective review of all rAAA patients presenting to a single academic center between January 2002 and December 2018 was performed. Patients were divided into 3 cohorts based on when institutional practice changes occurred: the pre-endovascular (rEVAR) era (1/2002-7/2007), the pre-risk score use era (8/2007-10/2013), and the modern era (11/2013-12/2018). The primary outcome measured was 30-day mortality. Our preoperative risk score assigns 1 point for each of the following: age>76, pH<7.2, Cr>2, and hypotension (systolic blood pressure <70). Previously published mortality based on retrospective analysis of the first 2 cohorts was 22% for 1 point, 69% for 2 points, 78% for 3 points, and 100% for 4 points. The goal of this study was to prospectively validate this scoring system in the third cohort.

Results: During the 17-year study period, 417 patients with rAAA were treated at our institution. Of the 118 patients treated in the modern era, 45 (38.1%) underwent open repair (rOAR), 61 (51.7%) rEVAR, and 12 (10.2%) were treated with comfort measures only. Excluding the 12 patients not repaired (Table I), there was a statistically significant linear trend between the preoperative risk score and subsequent 30-day mortality for all patients combined ($P < .0001$), for rOAR patients alone ($P = .0003$) and for rEVAR patients alone ($P < .0001$). After adjustment for preoperative risk score, the 30-day mortality was 41.3% versus 31.6% following rOAR versus rEVAR, respectively ($P = .2$). For all repairs, 30-day mortality was 14.6% for a score of 0, 35.7% for 1, 68.4% for 2, and 100% for a score of 3 or 4.

Conclusions: Our results, representing one of the largest modern series of rAAA treated at a single institution, confirm the accuracy of a simple 4-point preoperative risk score in predicting 30-day mortality in the modern rAAA patient. Such tools should be used when discussing treatment options with patients and family members to help guide transfer and treatment decision making.

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Table I: 30-Day Mortality by Repair Type and Risk Score

Risk Score	Combined Mortality	rOAR Mortality	rEVAR Mortality
0	6/41 (14.6%)	2/17 (11.8%)	4/24 (16.7%)
1	15/42 (35.7%)	11/20 (55.0%)	4/22 (18.2%)
2	13/19 (68.4%)	4/7 (57.1%)	9/12 (75.0%)
3	3/3 (100%)	1/1 (100%)	2/2 (100%)
4	1/1 (100%)	0/0 (NA)	1/1 (100%)
P-value (trend)	<.0001	.0003	<.0001

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B. French: Nothing to disclose, **M. Caps:** Nothing to disclose,
T. Benyakorn: Nothing to disclose, **E. Quiroga:** WL Gore: Consultant,
N. Tran: Nothing to disclose, **N. Singh:** Nothing to disclose,
B. W. Starnes: Aortica Corporation: Co-Founder

2. The Natural History of Large Abdominal Aortic Aneurysms in Patients Without Timely Repair: Implications for Rupture and Mortality

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Objective: Contemporary data on the natural history of large abdominal aortic aneurysms (AAA) in patients undergoing delayed or no repair are lacking. In this study, we examine the impact of large AAA size on the incidence of rupture and mortality.

Methods: From a prospectively maintained aneurysm surveillance registry, patients with an unrepaired, large AAA (≥ 5.5 cm in men and ≥ 5.0 cm in women) at baseline (i.e., index imaging) or who progressed to a large size from 2003-2017 were included, with follow up through March 2020. Outcomes of interest obtained by manual chart review included rupture (confirmed on imaging/autopsy), probable rupture (timing/findings consistent with rupture without more likely cause of death), repair, reasons for delayed (>1 year after diagnosis of large AAA) or no repair and mortality. Cumulative incidence of rupture was calculated using the Aalen-Johansen Estimator, accounting for the competing events of death and aneurysm repair.

Results: Of the 2,266 eligible patients (median age 84.7 years (IQR 77.4-90.6), 66% male, 79% white, 34% current smokers), 437 (19%) had large AAA at index imaging, and 1,829 (81%) progressed to large AAA during the follow-up period, with a median time to qualifying size of 4.0 years (IQR 1.9-6.8). In total, 1,351 (60%) patients underwent repair, of which 329 were delayed >1 year; 915 (40%) did not undergo repair.

The most common reasons for delayed repair were discordant AAA measurements between surgeon and radiologist (34%) and comorbidity (20%); while the most common reasons for no repair were patient preference (49%) and comorbidity (29%). Among patients with delayed repair (median time to repair 2.0 years, IQR 1.4-3.1), 9 (2.7%) developed symptomatic aneurysms and an additional 11 (3.3%) ruptured. Of patients with no repair, 88 (9.6%) ruptured. The 3-year cumulative incidence of rupture was 5.6% for initial AAA size 5.0-5.4 cm (women only), 3.2% for 5.5-6.0 cm, and for 8.5% for 6.1-7.0 cm (Table 1).

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Conclusions: In this large cohort of AAA registry patients over 17 years, annual rupture rates for large AAA are lower than previously reported, with possible increased risk in women. Further analyses are ongoing to identify those at increased risk for aneurysm rupture, and may provide targeted surveillance regimens and improve patient counseling.

Table 1: Cumulative incidence of AAA rupture based on first large size

	12 Mo		24 Mo		36 Mo	
	%	95% CI	%	95% CI	%	95% CI
5.0 to 5.4 cm (women), n=527	2.7	1.5-4.3	4.0	2.6-5.9	5.6	3.8-7.8
5.5 to 6.0 cm, n=1,302	1.5	1.0-2.3	2.6	1.8-3.6	3.2	2.4-4.3
6.1 to 7.0 cm, n=358	5.6	3.5-8.3	7.3	4.9-10.3	8.5	5.9-11.7
>7.0 cm, n=79	17.9	10.4-27.1	20.5	12.4-30.1	--	--

Author Disclosures: **E. M. Lancaster:** Nothing to disclose,

R. C. Gologorsky: Nothing to disclose, **M. M. Hull:** Nothing to disclose,

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A. L. Avins: Nothing to disclose, **J. L. Adams:** Nothing to disclose,

R. W. Chang: Nothing to disclose

3. Towards Endovascular Treatment of Type A Aortic Dissection: Smaller Landing Zones, More Patient Eligibility

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Objective: Type A or ascending aortic dissection is an acute life-threatening condition with high morbidity and mortality. Open surgery remains standard-of-care. Development of minimally invasive endografts for Type A aortic dissection (TAAD) will require detailed anatomic understanding of dissection and aortic root anatomy in order to determine optimal device specifications.

Methods: Computed tomography images of TAAD cases treated at our institution from 2012-2019 were reviewed to measure ascending aorta/aortic root dimensions, as well as location and extent of dissection compared to coronary ostia. Centerline length measurements and diameters of key anatomic structures were obtained using OsiriX 10.0 (Bernex, Switzerland) (Figures 1 & 2).

Results: 53 patients had TAAD with mean age 60.4 ± 17.1 years, (36 male, 17 female). TAAD surgical intervention was performed for 46/53 patients. Four patients experienced mortality within 30 days of intervention. TAAD anatomy is presented in Table 1; aortic root/ascending aorta measurements are presented in Table 2. The entry tear was distal to the highest coronary ostium in 48 cases. These cases were retrospectively considered for endovascular intervention with a non-branched, single endograft stent. Proximal landing zone (LZ) was defined as distance from the highest coronary ostia to entry tear. 35/48 (66.0%) had a proximal LZ length ≥ 2.0 cm (criterion for Gore Type A dissection trial), 38/48 (71.7%) had proximal LZ length ≥ 1.5 cm, and 42/48 (79.2%) had proximal LZ length ≥ 1.0 cm. Proximal and distal LZ diameters of the STJ and distal ascending aorta regions were (median [1st quartile-3rd quartile]) 3.29cm [2.73-4.10cm] and 3.49cm [3.09-3.87cm], respectively, with length from STJ to innominate takeoff 11.24cm [9.47-12.30cm]. Ascending aorta radius of curvature at the centerline was 6.48cm [5.27-8.00cm].

Conclusions: Endovascular treatment of TAAD has potential to improve morbidity and mortality of this life-threatening condition. Devices specific for treatment of TAAD need enhanced precision deployment with seal zones shorter than those of commercially available thoracic devices to increase patient eligibility. These results serve as a guide for specifications of endovascular devices designed to treat this devastating condition.

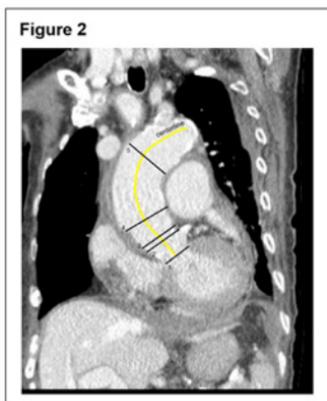
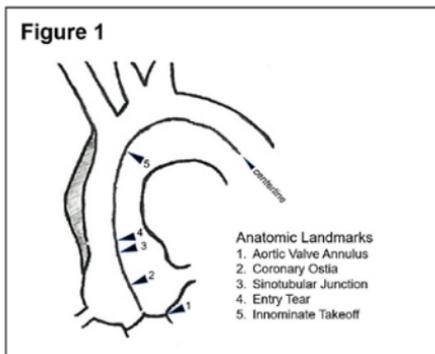


Table 1: Characteristics of Type A Dissections

<u>Proximal Extent of False Lumen</u>	<u>N/53 (percent)</u>
Aortic valve annulus	7/53 (13.2%)
Sinuses of valsalva	12/53 (22.6%)
Sinotubular junction	17/53 (32.0%)
Proximal ascending aorta	10/53 (18.9%)
Mid-ascending aorta	5/53 (9.4%)
Distal ascending aorta	2/53 (3.8%)
<u>Distal Extent of False Lumen</u>	
Mid-ascending aorta	4/53 (7.5%)
Distal ascending aorta	1/53 (1.9%)
Proximal aortic arch	7/53 (13.2%)
Mid-aortic arch or beyond	41/53 (77.4%)

Table 2: Aortic Root and Type A Dissection Measurements

<u>Aortic Root and Ascending Aorta Diameters</u>	<u>Median (1st IQR - 3rd IQR), cm</u>
Aortic valve annulus	2.50 (2.26 - 2.80)
Sinuses of Valsalva	4.00 (3.50 - 4.59)
Sinotubular junction	3.29 (2.73 - 4.10)
Mid-ascending aorta	3.90 (3.13 - 4.46)
Distal ascending aorta	3.49 (3.09 - 3.87)
<u>Lengths Along Centerline from Aortic Valve Annulus</u>	
Left coronary ostium	1.81 (1.37 - 2.10)
Right coronary ostium	1.27 (0.97 - 1.70)
Sinotubular junction	2.58 (2.20 - 3.15)
Innominate artery takeoff	11.24 (9.47 - 12.30)
Entry tear	4.90 (3.19 - 6.06)

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V. Kumar: Nothing to disclose, **S. Vartanian:** Nothing to disclose,
A. Z. Oskowitz: Nothing to disclose

4. Aortic Neck Dilation Following Repair of Juxtarenal Aneurysms with Fenestrated Endovascular Aneurysm Repair

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Objective: Aortic neck dilation is a reported mode of failure and can be associated with aneurysm sac expansion following endovascular repair of aortic aneurysms. Fenestrated repairs of the juxtarenal segment increase the seal zone length and are often utilized to treat this disease progression. However, the frequency and risk factors for neck dilation following fenestrated repairs is unknown.

Methods: We evaluated 124 continuous fenestrated EVARs (FEVARs) performed under an investigational device exemption for juxtarenal aneurysms (#NCT01538056). The aortic diameter at the level of the Superior Mesenteric Artery (SMA) (highest fenestration) and lowest renal artery (lowest fenestration) were assessed preoperatively, at 30-days, and annually for 3 years. A subgroup analysis was then performed to assess aortic neck dilation by the graft type utilized, degree of oversizing, infrarenal neck length, effective seal zone length, and aortic diameter at the level of the lowest and highest fenestration.

Results: Of the 124 patients, we included 101 FEVARs. Those without preoperative or follow-up data were excluded. The aortic diameter increased significantly by 3 years at both the level of the superior mesenteric artery (SMA) (2mm, $P<.01$) and lowest renal artery (3.3mm, $P<.01$). In subgroup analysis of aortic diameter at the level of SMA, neck length less than 10mm was associated with aortic dilation (<5 mm: 2.5mm $P<.01$, 5-10mm: 2.8mm, $P<.01$). Additionally, aortic dilation also occurred at 3 years among all graft types, effective seal zone lengths, and diameters. When evaluating aortic diameter at the level of the lowest renal artery, infrarenal neck length less than 10 was also associated with aortic dilation (<5 mm: 3.3 $P<.01$, 5-10:3.4, $P=0.01$); however only the Treo with associated with significant growth. (5mm, $P<.01$). Graft diameters less than 32mm also were associated with significant aortic growth (Table).

Conclusions: Aortic neck dilation in the visceral segment is seen following endovascular repair of juxtarenal aneurysms using FEVARs. This aortic growth is associated with neck length less than 10mm, with trends noted in other anatomic and operative factors. Further research is warranted to determine how these changes may affect long-term outcomes.

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	Lowest Renal Artery			Superior Mesenteric Artery		
	Preoperative Diameter Mean (SD)	3-Year Diameter Mean	P-Value	Preoperative Diameter Mean	3-Year Diameter Mean	P-Value
Diameter	25.6 (3.8)	28.5 (3.6)	<0.01	25.8 (3.0)	27.8 (3.7)	<0.01
Graft Type						
Endurant	25.2 (5.2)	30 (1.6)	0.29	25.9 (3.7)	28.5 (4.6)	<0.01
Zennith	25.5 (3.8)	27.2 (3.4)	0.16	25.3 (2.9)	27.5 (3.6)	<0.01
Treo	25.8 (3.6)	30.8 (3.1)	<0.01	26.8 (2.8)	29.7 (2.1)	0.04
Infrarenal Neck Length						
<5mm	26 (3.9)	29.3 (3.0)	<0.01	25.1 (3.1)	27.6 (4.2)	<0.01
5-10mm	24.9 (3.3)	28.3 (3.5)	0.01	25.3 (3.2)	28.1 (3.5)	<0.01
10-15mm	25 (3.6)	26.6 (5.0)	0.68	25.8 (2.0)	27.1 (3.2)	0.18
>15mm	25.5 (10.6)	27.5 (6.4)	0.89	25.8 (3.3)	28.8 (4.3)	0.02
Maximal AAA Diameter						
<55mm	25.0 (4.9)	29.8 (2.8)	0.11	24.3 (1.5)	24.7 (3.5)	0.81
55-70mm	25.1 (4.0)	28.4 (3.6)	<0.01	25 (3.1)	28 (3.9)	<0.01
>70mm	26.4 (3.4)	28.5 (4.0)	0.19	26.5 (2.7)	28.2 (3.1)	<0.01
Oversizing						
<10%	26.0 (4.1)	30.5 (2.5)	0.01	27.0 (3.6)	27.3 (5.1)	0.046
10-15%	26.2 (4.2)	26.8 (4.0)	0.74	26.9 (2.8)	28.2 (3.4)	0.03
15-20%	24.6 (3.4)	28.9 (3.5)	<0.01	25.0 (2.7)	27.0 (3.5)	<0.01
>20%	24.6 (3.4)	28.9 (3.5)	0.34	24.5 (2.1)	29 (3.2)	<0.01
Graft Diameter						
22-26	21.9 (2.8)	28.8 (3.7)	<0.01	22.5 (1.9)	23.9 (2.3)	0.01
28-30	25.4 (2.7)	29.2 (3.5)	<0.01	25.5 (1.9)	27.8 (2.2)	<0.01
32-36	28.2 (3.6)	27 (3.5)	0.37	28.5 (2.1)	30.6 (3.1)	<0.01
Effective Seal Zone Length						
<34.9	26.2 (4.1)	27.3 (3.1)	0.40	25.8 (3.6)	28.1 (4.9)	<0.01
34.9-41.1	25.6 (4.8)	29.0 (2.8)	0.06	23.8 (2.1)	26.3 (2.9)	<0.01
41.1-47.7	24.0 (2.8)	29.3 (3.5)	<0.01	26.1 (2.3)	29.7 (2.8)	<0.01
>47.7	26.1 (3.9)	28.9 (4.4)	0.16	25.9 (3.5)	27.6 (3.2)	<0.01

Author Disclosures: **S. L. Zettervall:** Nothing to disclose, **K. Dansey:** Nothing to disclose, **B. W. Starnes:** Aortica Corporation: Co-Founder

5. Changes in Transfer and Mortality Rates Following Western Vascular Society Guideline Publication for the Management of Ruptured Abdominal Aortic Aneurysms

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Objective: In 2017, the Western Vascular Society (WVS) published transfer guidelines for ruptured abdominal aortic aneurysm (rAAA) to improve transfer systems and survival. This study explores the effect of this publication on transfer and mortality rates in rAAA patients undergoing endovascular aneurysm repair (rEVAR).

Methods: The 2015-2019 Vascular Quality Initiative was queried. Primary outcomes were the proportion of rEVARs transferred and rEVAR mortality pre- and post-guidelines publication. Student's t-test, adjusted logistic regression, and a quasi-experimental interrupted time-series analysis were performed.

Results: 2,133 rEVARs and 1,300 (60.9%) transfers were identified. Although the average absolute number of monthly transferred rEVARs was higher post-guidelines (19.7 ± 4.6 vs. 23.2 ± 5.6 ; $p=0.01$), the proportion transferred did not change significantly (0.60 ± 0.09 vs. 0.61 ± 0.08 ; $p=0.62$). In multivariable logistic regression, there was no significant increase in odds of rEVAR transfer post-guidelines [OR 1.10 (95% CI 0.92-1.33); $p=0.30$]. Factors associated with non-transfer were disoriented mental status [OR 0.70 (0.53-0.93); $p=0.01$], African American race [OR 0.63 (0.45-0.88) $p=0.006$], and Hispanic ethnicity [OR 0.49 (0.29-0.83); $p=0.008$] (Table 1). Age, gender, functional status, and hemodynamics were not significantly associated with transfer. Overall mortality did not change significantly post-guidelines ($22 \pm 0.05\%$ vs. $21 \pm 0.06\%$; $p=0.60$). Increased rEVAR mortality was associated with age >69 years, altered mental status, pre-op cardiac arrest, and lowest SBP <70mmHg. On interrupted time-series analysis, the transfer rate actually increased by 6.8% (± 0.04 ; $p=0.13$), and mortality decreased by 4.7% (± 0.03 ; $p=0.10$) immediately post-guidelines, but this was neither statistically significant nor sustained over time (Figure 1).

Conclusion: WVS guidelines publication was associated with an immediate increase in the rate of rEVAR transfer, but this was not associated with sustained changes in mortality. Despite being mentioned as considerations for transfer, age, functional status, and hemodynamics were not associated with rEVAR transfer. These factors were however associated with rEVAR mortality,

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suggesting that closer guideline adherence may be prudent. Administration

Table 1. Postoperative patterns of readmissions in the Veterans Health Administration

Multivariable Logistic Regression Outcome	rEVAR Transfer			rEVAR In-Hospital Mortality*				
	Adjusted OR	95% CI		p-value	Adjusted OR	95% CI		p-value
Demographic Variables								
Age (ref: 60-69)								
Age 70-79	1.13	0.90	1.43	0.30	1.80	1.29	2.51	<0.001
Age 80-89	1.13	0.86	1.49	0.37	2.46	1.70	3.55	<0.001
Age ≥ 90	1.30	0.82	2.06	0.27	2.00	1.10	3.63	0.02
Race (ref: Caucasian)								
Asian	0.67	0.31	1.47	0.32	1.19	0.44	3.24	0.74
African American	0.63	0.46	0.88	0.01	0.78	0.48	1.27	0.31
Hispanic Ethnicity (ref: Not Hispanic)	0.49	0.29	0.84	0.01	0.95	0.46	1.95	0.88
Female Gender (ref: Male)	0.97	0.77	1.22	0.78	1.14	0.84	1.54	0.40
Functionally dependent (ref: Independent)	0.86	0.54	1.36	0.51	1.00	0.55	1.80	0.99
Clinical Variables								
Mental Status (ref: Normal)								
Disoriented	0.70	0.53	0.93	0.01	2.43	1.76	3.36	<0.001
Unconscious	1.19	0.82	1.73	0.37	2.65	1.78	3.95	<0.001
Pre-op cardiac arrest (ref: No arrest)	1.00	0.63	1.59	0.99	4.34	2.62	7.18	<0.001
Lowest Systolic Blood Pressure < 70mmHg (ref: 70-90mmHg)	0.93	0.71	1.21	0.57	1.45	1.06	1.98	0.02

*also adjusted for maximum AAA diameter, insurance status, anesthesia, time from symptoms to repair, and time from admission to repair.

Author Disclosures: **E. L. George:** Nothing to disclose, **V. T. Ho:** Nothing to disclose, **K. A. Rothenberg:** Nothing to disclose, **K. Tran:** Nothing to disclose, **J. T. Lee:** Nothing to disclose, **J. R. Stern:** Nothing to disclose

6. Factors Influencing Medical Student Choices in the 2020 Integrated Vascular Surgery Match: Implications for the Upcoming 2021 Covid-19 Affected Match

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Objective: Although the COVID-19 outbreak did not affect the 2020 Integrated Vascular Surgery (VS) Residency Match, future travel and educational restrictions will likely impact applicants in the upcoming cycle. We sought to better understand recruitment strategies, logistics of away rotations, and the interview process.

Methods: An anonymous survey was sent to matched students in 2020, inquiring about motivations for pursuing VS, logistic of away rotations and interviews, and factors influencing students' rank list.

Results: Seventy of the 73 matched students completed the survey (95.9% response rate). The median age was 27 (25-41), 32.9% were female, 91.4% were US medical students, and 77.1% were from institutions with a VS training program. Factors most strongly influencing the decision to choose VS as a career were open vascular procedures, endovascular procedures, perceived job satisfaction, emerging technologies, and influence of a mentor. The prospect of job market, salary, and competitiveness of the application process had the least impact (Table 1). Of the matched students, 82.9% did an away rotation (median 2; range 1-4), with a total cost >\$2500 for 51.7% of them. Fifty percent of students matched either at their home institution or where they had performed an away rotation. Students applied to a median of 50 programs (range 1-70) and interviewed at 17 (range 1-28), with a total cost of >\$4000 for 40% of them (Table 2). The most important factors affecting students' rank list were program culture, open aortic surgery volume, geography, and complex endovascular procedure volume. Tour of facilities, resident salary, and large male resident/faculty representation had the least importance (Table 1).

Conclusions: Successfully matched applicants in 2020 prioritized operative case volume and program collegiality when ranking programs. Despite their high cost, away rotations played an important role in Match, suggesting time spent at potential institutions allowed ideal assessment of factors for students. The high average number of away rotations and in-person interviews performed in 2019-

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Table 1: Reasons for choosing vascular surgery as a career and factors impacting students' rank list

Reasons for choosing vascular surgery as a career	Weighted Average \pm SD* (n=70)	Factors impacting students' rank list	Weighted Average \pm SD (n=70)
Open procedures	2.86 \pm 0.35	Culture and collegiality of a program	2.79 \pm 0.51
Endovascular procedures	2.64 \pm 0.51	Open aorta volume	2.5 \pm 0.68
Perceived job satisfaction	2.59 \pm 0.55	Geographic location of a program	2.37 \pm 0.84
Use of emerging technology	2.56 \pm 0.61	Complex endovascular volume	2.37 \pm 0.68
Influence of a mentor	2.5 \pm 0.76	Specific mentor(s) at a program	2.31 \pm 0.91
Patient population	2.46 \pm 0.74	Prestige of a program	2.26 \pm 0.81
Shorter training compared to other surgical specialties	2.27 \pm 0.87	Personal or co-applicants' experience as a sub-I at a program	2.12 \pm 1.02
No need for sub-specialization	2.09 \pm 1	Guided tour of the facilities on the interview day	0.77 \pm 0.83
Job market	1.74 \pm 0.97	Resident salary	0.64 \pm 0.82
Future salary	1.47 \pm 0.91	Large male resident/faculty representation in a program	0.5 \pm 0.83
Competitiveness of application process	1.33 \pm 0.96	Desire to stay in the same place as medical school	0.39 \pm 0.75

Table 2: The cost and burden of applications and Interviews

Factors Associated with Applications and Interviews		N=70
No. of IVSR programs applied to (Median, range)		50 (1-70)
No. of IVSR interview offers received (Median, range)		25 (1-52)
No. of IVSR interviews attended (Median, range)		17 (1-28)
No. of applicants who applied into general surgery		50% (35)
No. of general surgery interviews attended (Median, range) ¹		2 (0-17)
No. of applicants who turned down interviews for financial reasons		32.9% (23)
No. of applicants who turned down interviews because they were not able to respond quickly enough to the invitation to secure a preferred date		37.1% (26)
No. of applicants who turned down interviews due to scheduling conflict with other programs		88.6% (62)
Total time spent completing ERAS and writing the personal statement	0-10 hours	10% (7)
	10-20 hours	51.4% (36)
	20-30 hours	22.9% (16)
	>30 hours	15.7% (11)
Total cost of completing all interviews	<\$2,000	2.9% (2)
	\$2,000-\$4,000	20% (14)
	\$4,000-\$6,000	37.1% (26)
	>\$6,000	40% (28)

IVSR: Integrated vascular surgery residency; 1: including only those who applied into general surgery; ERAS: electronic residency application service

Author Disclosures: **A. Fereydooni:** Nothing to disclose, **J. L. Ramirez:** Nothing to disclose, **K. L. Morrow:** Nothing to disclose, **V. Chandra:** Nothing to disclose, **D. M. Coleman:** Nothing to disclose, **J. T. Lee:** Nothing to disclose

7. Understanding Value and Patient Complexity Among Common Inpatient Vascular Surgery Procedures

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Objective: Prior study has identified vascular surgery patients as the second most complex, only behind cardiac surgery. However, unlike cardiac surgery, work relative value units (wRVU) for vascular surgery were relatively undervalued based on an overall complexity score. This study assesses the correlation of patient complexity with wRVU in the most commonly performed vascular procedures.

Methods: The 2014-17 NSQIP was queried for inpatient cases performed by vascular surgeons. A previously developed patient complexity score utilizing pre-, intra-, and post-operative domains was calculated. This included patient age, ASA class ≥ 4 , major comorbidities, emergent status, concurrent procedures, additional procedures, LOS, non-home discharge, 30-day major complications, readmissions, and mortality. Procedures were assigned points based on their relative rank and then an overall score was created by summing the total points. An observed to expected ratio (O/E) was calculated using open ruptured infrarenal aortic aneurysm repair (rOAAA) as the referent and then applied to an adjusted median wRVU/operative min.

Results: Among 164,370 cases, patient complexity was greatest for rOAAA (128) and the least for CEA (29) (range: 29-128, Fig 1). The rOAAA patients had the top proportion of ASA class ≥ 4 (84.8%; CI=82.6-86.8%), highest mortality (35.5%; CI=32.8-38.3%), and major complication rate (87.1%; CI=85.1-89.0%). CEA had the lowest mortality (0.7%; CI=0.7-0.8%), major complication rate (8.2%; 95% CI=8.0-8.5%), and shortest LOS (2.7 days; CI=2.7-2.7) (Fig 2). Median wRVU ranged from 10-42.1 and only weakly correlated with overall complexity (Spearman's $\rho=0.11$; $p<0.01$). Median wRVU/operative min is presented in Table 1. After adjusting for patient complexity, CEA (O/E=3.8) and TCAR (O/E=2.8) had greater than expected O/E. In contrast, lower extremity bypass (O/E=0.77), lower extremity embolectomy (O/E=0.79), and open abdominal aortic repair (O/E=0.80) had lower than expected O/E.

Conclusions: Patient complexity varies substantially across vascular procedures and is not effectively captured by wRVU. Furthermore, the increased operative time for open procedures is not adequately accounted for by wRVU, which has the potential to inappropriately impact surgical decision making.

SCIENTIFIC SESSION ABSTRACTS continued

Figure 1. Procedures ranked by overall patient complexity score.

	Overall Ranking	Frequency	Median wRVU (IQR)	Overall Complexity Score
1.	rOAAA	1,198	42 (42-42)	128
2.	LE Embolectomy	3,599	20 (20-20)	125
3.	TEVAR	1,816	30 (30-35)	119
4.	Amp	13,055	14 (13-15)	111
5.	OAAR	4,646	34 (34-37)	104
6.	LEB	23,578	27 (21-32)	91
7.	EVAR	21,632	24 (24-25)	83
8.	TCAR	1,303	18 (18-20)	48
9.	CEA	43,825	21 (21-21)	29

Figure 2. Procedure rankings by individual domains of complexity.

	Preoperative			Intraoperative				Postoperative			
	Age	ASA class ≥ 4	Major Comorbidities	Emergent Operation	Concurrent Procedure	Additional Procedure	Length of Hospital Stay	Non-Home Discharge	Readmission	Major Complication	Mortality
1.	EVAR	rOAAA	Amp	rOAAA	TEVAR	TEVAR	Amp	LE Embolectomy	rOAAA	rOAAA	
2.	rOAAA	TEVAR	TCAR	LE Embolectomy	OAAR	EVAR	rOAAA	LE Embolectomy	LEB	OAAR	LE Embolectomy
3.	CEA	Amp	LEB	TEVAR	OAAR	LE Embolectomy	OAAR	rOAAA	Amp	LE Embolectomy	TEVAR
4.	OAAR	OAAR	LE Embolectomy	Amp	EVAR	LEB	LE Embolectomy	LEB	TEVAR	Amp	OAAR
5.	TCAR	LE Embolectomy	rOAAA	EVAR	LEB	rOAAA	TEVAR	OAAR	TCAR	TEVAR	Amp
6.	TEVAR	EVAR	TEVAR	OAAR	LE Embolectomy	OAAR	LEB	TEVAR	EVAR	LEB	EVAR
7.	LE Embolectomy	TCAR	CEA	LEB	Amp	TCAR	EVAR	EVAR	OAAR	EVAR	LEB
8.	LEB	LEB	OAAR	CEA	TCAR	Amp	TCAR	CEA	CEA	TCAR	TCAR
9.	Amp	CEA	EVAR	TCAR	CEA	CEA	CEA	TCAR	OAAR	CEA	CEA

Table 1. Procedures ranked by observed/expected ratio of work relative value units (wRVU) per operative minute

	Median wRVU Per Operative Minute	Observed/Expected Ratio of wRVU Per Operative Minute
LEB	0.13	0.77
LE Thromboembo	0.18	0.79
OAAR	0.15	0.80
rOAAA	0.23	1.00 (referent)
TEVAR	0.25	1.15
Amp	0.24	1.18
EVAR	0.20	1.35
TCAR	0.24	2.76
CEA	0.20	3.81

Carotid endarterectomy = CEA; Lower extremity bypass = LEB; Endovascular abdominal aortic repair = EVAR; Amputation = Amp; Open abdominal aortic repair = OAAR; Lower extremity artery thromboembolectomy = LE thromboembo; Thoracic endovascular aortic repair = TEVAR; Transcarotid artery revascularization = TCAR; Ruptured open abdominal aortic repair = rOAAA.

Author Disclosures: **J. L. Ramirez:** Nothing to disclose, **J. Lopez:** Nothing to disclose, **K. Sanders:** Nothing to disclose, **P. A. Schneider:** Nothing to disclose, **W. J. Gasper:** Nothing to disclose, **M. S. Conte:** Nothing to disclose, **J. A. Sosa:** Nothing to disclose, **J. C. Iannuzzi:** Nothing to disclose.

8. Contemporary Outcomes of Traumatic Popliteal Artery Injury Repair

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Objective: Traumatic popliteal artery injuries are associated with the highest risk of limb loss of all peripheral vascular injuries, with amputation rates of 10-15%. The purpose of this study was to examine outcomes of patients undergoing operative repair for traumatic popliteal arterial injuries and identify perioperative risk factors for limb loss.

Methods: A multi-institutional retrospective review of all patients sustaining traumatic popliteal artery injuries from 2007-2018 was performed. All patients who had operative repair of popliteal arterial injuries were included in the analysis. Patients undergoing major lower extremity amputation (trans-tibial or trans-femoral) were compared to those with successful limb salvage at last follow-up. Significant predictors ($p < 0.05$) for amputation on univariate analysis were included in a multivariable analysis.

Results: A total of 302 patients from 10 institutions were included in the analysis. Median age was 32 years and 79% were male. Median follow-up was 72 days [IQR: 20 - 366]. Overall major amputation rate was 13%. Primary repair was performed in 17% of patients, patch repair in 2%, and bypass in 81%. One patient underwent endovascular repair with stenting [Table 1]. Of patients that lost primary patency, 44% ultimately required major amputation. Early loss of primary patency was 5 times more frequent in patients that went on to amputation. [Figure 1] On multivariate regression, significant perioperative risk factors for major amputation included, loss of primary patency, absence of detectable post-operative Doppler signals, and lack of post-operative antiplatelet therapy. [Table 2] Concomitant popliteal vein injury, location of popliteal injury (P1, P2, P3), ISS, and tibial vs. popliteal distal bypass target were not predictive for amputation.

Conclusion: Traumatic popliteal artery injuries are associated with a significant rate of major amputation. Lack of postoperative Doppler signals and loss of primary patency were highly predictive of major amputation, while postoperative antiplatelet therapy appears to be protective.

SCIENTIFIC SESSION ABSTRACTS continued

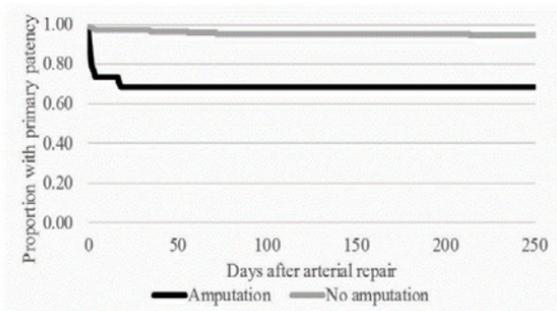
Table 1. Univariate analysis of risk factors for major amputation

	No amputation	Amputation	P value		No amputation	Amputation	P value
Age	32+/-13	36+/-17	0.30	Outflow vessel			
Male gender	79%	79%	0.98	Popliteal	74%	69%	0.54
Injury Severity Score (ISS)	13+/-9	16+/-11	0.070	Tibial	26%	31%	
Location of popliteal artery injury				No post-operative palpable pulse	33%	51%	0.032
P1	25%	16%		No post-operative Doppler signal	2%	17%	<0.001
P2	47%	51%	0.49	Loss of primary patency	6%	34%	<0.001
P3	28%	32%		Post-operative antiplatelets	76%	47%	<0.001
Concomitant popliteal vein injury	25%	24%	0.90				

Table 2. Multivariate analysis of risk factors for major amputation

Variable	Odds Ratio	95% CI	P value
No post-operative antiplatelets	4.8	1.8-13.1	0.001
Tibial outflow vessel	0.9	0.3-2.7	0.80
No post-operative palpable pulse	2.0	0.7-5.3	0.97
No post-operative Doppler signal	10.0	2.0-49.6	0.002
Loss of primary patency	6.0	1.7-21.8	0.002
Injury Severity Score (ISS)	1.0	1.0-1.1	0.20
Popliteal Vein Injury	0.4	0.9-1.5	0.11

Figure 1. Primary patency in amputated vs non-amputated patients



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9. Growth Rates of Small Abdominal Aortic Aneurysms (AAA) Identified in a Contemporary Practice

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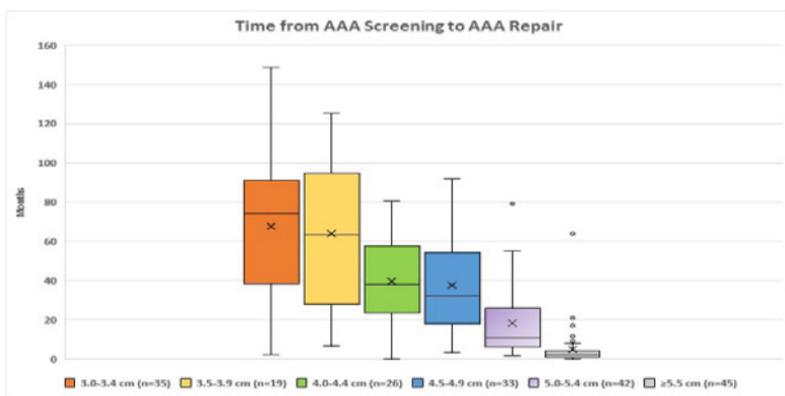
Objective: In Dec 2019, the United States Preventive Task Force (USPTF) recommended with moderate benefit, one-time screening for AAA in men 65-75 years of age with smoking history. USPTF suggested research evaluating rescreening benefits for persons screened negative for a 5.5 cm AAA and the timing of additional imaging studies. The purpose of this study was to evaluate the natural history of AAAs identified over a 10-year period to outline follow up surveillance intervals for detected AAAs.

Methods: A cohort observational study of all patients screened for AAA from 1/1/2007 - 12/31/2016, within a regional health care system was conducted. AAA was defined as an aortic diameter ≥ 3 cm. Clinical data, AAA size, time from screening to repair, and mortality rates were recorded. All data were analyzed through 12/31/2019.

Results: A total of 1,196 patients (Mean \pm SD, 76.3 \pm 6.8 years old) had detected AAA from screening. Average follow-up period was 6.5 \pm 3.3 years from date of screening to the end of the analysis or date of death. The average time from AAA screening to repair was 34.1 \pm 33.9 months (Figure). There were 204 AAA repairs on patients captured through screening, 87% (178/204) EVARs, 13% (26/204) open repairs, performed within the analysis period. Based upon initial screened aortic diameter, the median [95% CI] (years) from screening to repair were: 3.0-3.4 cm 6.2 [5.9-6.4]; 3.5-3.9 cm 5.3 [4.9-5.7]; 4.0-4.4 cm 3.2 [2.8-3.5]; 4.5-4.9 cm 2.7 [2.2-3.2]; 5.0-5.4 cm 0.9 [0.6-1.2]; ≥ 5.5 cm 0.2 [0.1-0.2]. Each patient averaged 1.6 \pm 2.4 ultrasounds and 0.9 \pm 1.5 CT scans for AAA surveillance (Table). There were 468 patient deaths (39%) and 9 possible ruptures occurred during the follow up period. These possible ruptures were patients who refused repair or were too high risk for repair.

Conclusions: After initial AAA diagnosis, we recommend the following AAA (3.0-5.4 cm) surveillance intervals until repair: 3.0-3.9 cm every 5 years; 4.0-4.4 cm every 3 years; 4.5-4.9 cm every 2 years, 5.0 - 5.4 cm every 6 months. No undiagnosed AAA ruptures were identified during the follow up period.

SCIENTIFIC SESSION ABSTRACTS continued



	3.0 - 3.4 cm (n=657)	3.5 - 3.9 cm (n=231)	4.0 - 4.4 cm (n=112)	4.5 - 4.9 cm (n=79)	5.0 - 5.4 cm (n=56)	≥5.5 cm (n=61)	All (N=1196)
	(mean ± stdev)						
Age (Yrs)	75.6 ± 6.6	77.5 ± 6.8	76.4 ± 6.8	78.9 ± 8.1	75.7 ± 6.3	76.2 ± 6.6	76.3 ± 6.8
Follow Up Length (Years)	6.7 ± 3.1	6.8 ± 3.3	6.0 ± 3.6	6.0 ± 3.3	6.0 ± 3.4	5.5 ± 3.5	6.5 ± 3.3
Follow Up Ultrasounds (n=1948)	1.4 ± 2.2	2.6 ± 2.9	2.3 ± 2.6	1.7 ± 1.8	0.7 ± 1.3	0.1 ± 0.4	1.6 ± 2.4
Follow Up CT Scans (n=1075)	0.7 ± 1.3	1.1 ± 2.0	1.2 ± 1.6	1.3 ± 1.6	1.4 ± 1.4	1.0 ± 1.1	0.9 ± 1.5
Time From Screening to Repair (Months)	67.6 ± 38.6	63.8 ± 37.7	39.7 ± 22.0	37.6 ± 23.6	18.2 ± 17.1	4.8 ± 10.1	34.1 ± 33.9
Time From Screening to Repair (Years)	5.6 ± 3.2	5.2 ± 3.1	3.3 ± 1.8	3.1 ± 1.9	1.5 ± 1.4	0.4 ± 0.8	2.8 ± 2.8
Total AAA Repairs (% total n)	35 (5.3)	21 (9.1)	27 (24.1)	33 (41.8)	42 (75.0)	46 (75.4)	204 (17.1)
LVAR (%)	31 (88.6)	20 (95.2)	22 (81.5)	28 (84.8)	40 (95.2)	37 (80.4)	178 (87.3)
Open (%)	4 (11.4)	1 (4.8)	5 (18.5)	5 (15.2)	2 (4.8)	9 (19.6)	26 (12.7)
Total Patients Deceased (%)	187 (28.5)	100 (43.3)	61 (54.5)	53 (67.1)	31 (55.4)	36 (59.0)	468 (39.1)

Author Disclosures: **E. S. Lee:** Nothing to disclose,
A. Gupta: Nothing to disclose, **K. C. Chun:** Nothing to disclose,
Z. T. Irwin: Nothing to disclose, **R. C. Anderson:** Nothing to disclose,
A. L. Gonzales: Nothing to disclose

10. Contemporary Experience with Paravisceral Aortic Aneurysm Repair in an Experienced Endovascular Center

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Objective: To describe contemporary outcomes from a single center capable of both complex open and endovascular aortic repair for paravisceral aortic aneurysms.

Methods: Data on all patients receiving treatment for aortic aneurysms with proximal extent at or above the renal arteries and distal to the inferior pulmonary ligament were reviewed. Coarsened exact matching (CEM) on age, aneurysm type, gender, CAD, previous aortic surgery and symptomatic status created balanced cohorts for outcomes comparisons.

Results: Between October, 2006 and February, 2018, 194 patients were treated for juxtarenal (40%), pararenal (21%), paravisceral (6%) and Type 4 thoracoabdominal (34%) aortic aneurysms with open (81, 42%) or endo (113, 58%). Endo repairs included renal coverage with a bifurcated graft (2%), unilateral (13%) or bilateral (4%) renal snorkels, Z-fen (15%), multi-branched graft (IDE protocol; 62%) and unique complex configurations (4%). On multivariable analysis, patients selected for open surgery were more likely to be symptomatic, whereas older patients, female patients and those with Type 4 TAAA extent were more often selected for endovascular treatment. Survival at 30 days was 97% for endo and 94% for open repair, 98% for both subgroups when excluding symptomatic cases, and was not different between the matched groups (98% vs 89%; $P=0.23$). Hospital and ICU stays were longer in open patients (8 vs. 10 days, 2 vs. 4, both $P\leq 0.001$). Post-op RIFLE grade 1/2 renal dysfunction was more common after open repair (14% vs. 24%, $P=0.001$). Spinal cord ischemia was significantly more frequent in the unmatched Endo group (11% vs. 1%, $P=0.02$). Composite major aortic complications were no different between treatment groups (unmatched $P=0.91$, matched $P=0.87$). Reintervention after 30 days occurred more frequently in the endo group ($P=0.002$). Estimated survivals at 1 and 5 years for endo and open are 96% vs. 81% and 69% vs. 89% respectively (Log-rank $P=0.57$).

Conclusions: Contemporary repair of PVAAA demonstrates safe outcomes with durable survival benefit when patients are well-selected for open or complex endovascular repair. We believe these data have implications for off-label device use in the treatment of PVAAA, and that open repair remains an essential option for younger, good risk patients in experienced centers.

SCIENTIFIC SESSION ABSTRACTS continued

Summary Table

Repair category n, (%)	Unmatched			Matched			Unmatched, No Type 4s		
	Endo	Open	P value	Endo	Open	P value	Endo	Open	P value
Survival at 30 days, %	113 (58)	81 (42)	0.23	82 (59)	56 (41)	-	63 (49)	66 (51)	-
Estimated survival									
1 year, 95%CI	-	-		96 (87 - 99)	81 (66 - 90)	0.57	94 (83 - 98)	88 (75 - 94)	0.01
5 year, 95%CI	-	-		77 (64 - 86)	78 (61 - 89)		63 (59 - 79)	77 (56 - 89)	
Major complication, %	34 (30)	25 (31)	0.91	23 (28)	15 (27)	0.87	20 (32)	16 (24)	
Spinal cord ischemia	12 (11)	1 (1)	0.02	8 (10)	1 (2)	0.13	6 (10)	0	0.04
Temporary, %	9 (8)	0	0.009	5 (6)	0	0.06	4 (6)	0	0.04
Permanent, %	3 (3)	1 (1)	0.48	3 (4)	1 (2)	0.52	2 (3)	0	0.15
Post-op ventilator >24H, %	4 (4)	24 (31)	<0.001	3 (4)	15 (27)	<0.001	2 (3)	19 (29)	<0.001
Intestinal ischemia, %	1 (1)	6 (8)	0.02	0	5 (9)	0.006	1 (2)	3 (5)	0.33
Renal dysfunction by RIFLE criteria, %									
Grade 1/2, %	24 (21)	36 (46)	<0.001	14 (17)	24 (44)	0.001	10 (16)	30 (47)	<0.001
Grade 3/4/5, %	6 (5)	12 (15)	<0.02	4 (5)	7 (13)	0.10	4 (8)	7 (11)	0.36
Reintervention			<0.001			0.002			0.001
Vascular	30 (27)	2 (2)		21 (26)	2 (4)		19 (30)	4 (6)	
Other	5 (6)	5 (6)		2 (2)	4 (7)		4 (6)	4 (6)	
Discharge home, %	91 (81)	45 (57)	<0.001	68 (84)	37 (66)	0.02	52 (84)	38 (58)	0.001

Author Disclosures: **D. S. Zarkowsky:** Nothing to disclose,
J. Inman: Nothing to disclose, **T. A. Sorrentino:** Nothing to disclose,
J. S. Hiramoto: Nothing to disclose, **S. Vartanian:** Nothing to disclose,
C. Eichler: Nothing to disclose, **L. Reilly:** Nothing to disclose,
W. Gasper: Nothing to disclose, **M. Conte:** Nothing to disclose

11. Complex Aortic Neck Anatomy does not Predict 30-day Mortality Following Ruptured Abdominal Aortic Aneurysm Repair

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Objective: Vascular surgeons have become increasingly comfortable performing EVAR for ruptured abdominal aortic aneurysms (rAAA). We hypothesized this has increased the complexity of patients transferred to quaternary care centers.

Methods: A retrospective review of all patients undergoing operation for rAAA at a high volume, single academic quaternary referral center between January 2002 and December 2018 was performed. Patients were divided into three eras based on when institutional practice changes occurred: the pre-EVAR era (1/2002-7/2007), the early EVAR era (8/2007-10/2013), and the modern era (11/2013-12/2018). Six hostile aortic neck features, based on current literature, were analyzed: neck length (mm), neck diameter (mm), neck angulation (Severe, Not Severe), neck morphology (Parallel, Irregular, Reverse Funnel, Inverted Funnel), neck calcification (Mild, Moderate, Severe), and neck thrombus (None, <25%, 25-50%, >50%). Thirty-day mortality was the primary outcome.

Results: 417 patients were evaluated with rAAA over a 17-year period, 391 went to the operating room for either rEVAR or open repair. Anatomic data was available for 283 patients during this time frame, with 133 undergoing rEVAR and 150 undergoing open repair. In the modern era there was an increase in patients with severe neck angulation ($p < 0.01$), but other individual hostile neck features did not significantly increase (Table 1). However, there was an increase in patients with three or greater hostile neck features present who required open repair compared to previous eras (57% vs. 40%, $p < 0.01$) (Figure 1). Patients with three or more hostile neck features were more likely to undergo open repair compared to rEVAR (44% vs. 25%, $p < 0.01$). The presence of three or greater hostile neck features did not predict 30-day mortality in rEVAR (26% vs. 33%, $p = 0.5$) or open repair (46% vs. 45%, $p = 0.9$).

Conclusions: There has been an increase in patients with complex neck anatomy undergoing rAAA repair at our high-volume center in the modern era. These patients were more likely to undergo an open operation, but mortality was not correlated with the number of hostile neck factors present. Although patient anatomy is important in planning repair, patient physiology appears to have a greater impact on short term survival following rAAA repair.

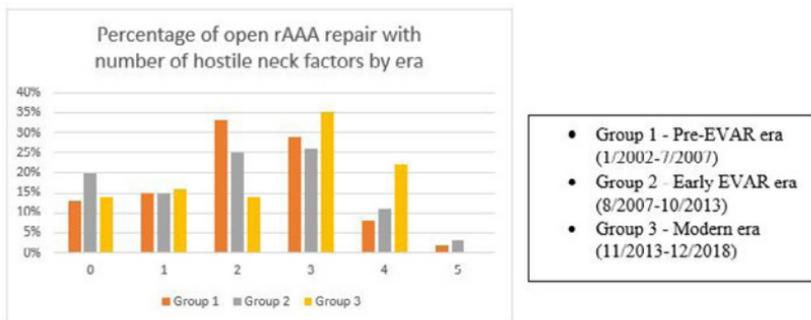


Figure 1. In Group 3 (modern era) a higher proportion of patients undergoing open repair had greater than three hostile neck factors compared to groups 1 and 2 (p<0.01).

Table 1. Comparison of hostile neck features in modern and previous eras.

	Total	Modern Era	Pre and Early EVAR Era	P-Value
Mean Neck Length (SE)	17.2 (0.9)	16.6 (1.7)	17.4 (1.0)	0.7
Mean Neck Diameter (SE)	26.2 (0.4)	26.0 (0.6)	26.4 (0.5)	0.6
Severe Neck Angulation, N (%)	14 (5.0%)	14 (17%)	0 (0%)	<0.01
Non-Parallel Neck, N (%)	130 (45.9%)	40 (44.9%)	90 (46.4%)	0.4
Neck Calcification, N (%)	121 (43.2%)	29 (33.0%)	92 (47.9%)	0.08
Neck Thrombus, N (%)	70 (31.5%)	18 (20.5%)	52 (38.8%)	0.03

Author Disclosures: **B. French:** Nothing to disclose, **J. Hemingway:** Nothing to disclose, **T. Benyakorn:** Nothing to disclose, **M. Caps:** Nothing to disclose, **E. Quiroga:** WL Gore: Consultant, **N. Tran:** Nothing to disclose, **N. Singh:** Nothing to disclose, **B. W. Starnes:** Aortica Corporation: Co-Founder

12. Predictors of Sac Regression and Mortality After Fenestrated Endovascular Aneurysm Repair (f-EVAR)

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Objective: Aneurysm sac regression following standard EVAR is a desired outcome well studied utilizing infrarenal devices. Similar data is limited regarding sac remodeling after fenestrated EVAR. We sought to identify predictors of sac regression following FEVAR, and explore the association of sac regression and mortality.

Methods: Clinical and radiographic data of patients undergoing elective FEVAR using the Cook Zenith Fenestrated (ZFEN) device between 2012 and 2018 at a single institution were retrospectively reviewed. Maximum aneurysm diameter was measured from pre-discharge CT and used as a baseline, and sac regression was followed at the 6-month, 1 year, and annual CTs. Patients were categorized into REG GROUP (≥ 5 mm regression in aneurysm diameter compared to baseline), and patients with < 5 mm regression or sac growth (NON-REG group). Univariate analysis and logistic regression were used to identify predictive factors for sac regression.

Results: Among 200 consecutive patients undergoing FEVAR, 132 had reached at least one follow-up CTA for comparison. At a mean follow-up of 33.1 ± 21.4 months, almost half of patients experienced significant sac regression and comprised the REG group ($n=65$, 49.2%). REG patients had smaller diameter devices, and were less likely to have concomitant chimney grafts placed ($p < 0.05$). NON-REG patients had a higher rate of type II endoleak (35.8% vs. 12.3%, $P=0.002$). Multivariate analysis identified adjunctive parallel procedures [OR=0.271 (0.097-0.759); $P=0.013$], and type II endoleak [OR=0.180 (0.063-0.515); $P=0.001$] as independent predictors of sac non-regression. Overall mortality was higher in the NON-REG group (3% vs. 0%, $P=0.008$). On log-rank testing, sac regression was associated with a significant mortality benefit at 72 months compared to non-regression ($P < 0.001$; Fig. 1).

Conclusions: Regression of the excluded aneurysm sac after FEVAR appears to be less common in patients with type II endoleaks and those undergoing concomitant parallel grafting. Sac regression > 5 mm was associated with a significant survival benefit during mid-term follow-up, and should be used as a clinical marker for success after FEVAR.

SCIENTIFIC SESSION ABSTRACTS continued

Author Disclosures: **M. Li:** Nothing to disclose, **J. Stern:** Nothing to disclose, **K. Tran:** Nothing to disclose, **C. Deslarzes-Dubuis:** Nothing to disclose, **J. Lee:** Nothing to disclose

13. Early Ankle Brachial Index Testing is Associated with Decreased Risk of Amputation for Patients with Lower Extremity Ulcers

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Objective: Patients with lower extremity wounds from diabetes mellitus or peripheral artery disease have a risk of amputation as high as 25%. In patients with arterial disease, revascularization decreases the risk of amputation. We aimed to determine if early assessment of arterial perfusion correlates with amputation rates.

Methods: We retrospectively reviewed patients referred to the vascular clinic over 18 months with lower extremity wounds to determine when and when a complete pulse exam and diagnostic studies to evaluate perfusion were performed. Kaplan Meier analysis was used to determine if timing affected outcomes for treatment and risk of amputation.

Results: Eighty-nine patients with lower extremity wounds were identified. Of these, 52 patients (58%) did not have a pulse exam performed by their primary care provider when the wound was identified. (Table) Patients were classified by when they underwent ankle brachial index testing to assess arterial perfusion. Eighteen had early ABI (<30 days) testing, with the remaining 71 patients having late ABI testing. Patients in the early ABI group were more likely to have a pulse exam done by their PCP than those in the late group, 12 (67%) vs 25 (34.7%), $p = 0.03$. Early ABI patients also had a quicker time to vascular referral (15 days vs. 125 days, $p < 0.001$) and quicker time to wound healing than those in the late group (119 days vs. 313 days, $p < 0.001$). Finally, patients that underwent early ABI were less likely to require amputation (Figure), although this did not reach statistical significance ($p = 0.06$).

Conclusions: Early ABI testing expedites specialty referral and time to revascularization. It can decrease time to wound healing. Larger cohort studies are needed to determine the overall effect of early ABI testing to decrease amputation rates.

SCIENTIFIC SESSION ABSTRACTS continued

	Patient characteristics		
	No Pulse Exam, n=52	Pulse Exam, n=37	p-value
Age (Mean and SD)	68.3years	68.8 years	0.84
Male Gender	31	28	0.18
Diabetes	38	27	0.73
Coronary Artery Disease	26	15	0.7
COPD	10	4	0.7
Median Time to Vascular Referral	36 days	61 days	0.17
Median Time to Revascularization	82 days	87 days	0.67
Median Time to Wound Healing	217 days	300 days	0.77

Author Disclosures: **A. Aguirre:** Nothing to disclose,
A. Arora: Nothing to disclose, **K. Sharma:** Nothing to disclose,
M. D. Humphries: Nothing to disclose

14. Medicaid Expansion and Lower Extremity Amputation Among Urban and Rural Beneficiaries with Chronic Limb-threatening Ischemia

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Objective: To assess differences in the rates of major amputation based on the location of residence among patients with chronic limb-threatening ischemia (CLTI) in states that expanded Medicaid under the Affordable Care Act (ACA) and states that did not.

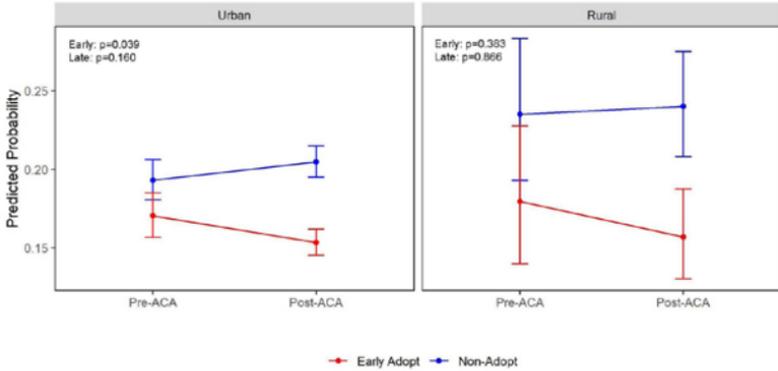
Methods: We used the State Inpatient Database (19 states) to identify Medicaid beneficiaries and uninsured patients aged 20-64 with CLTI from 2013 to 2015. We categorized patients into early-adopter states (implemented the ACA expansion by January 2014, n=12) and non-adopter states (no implementation, n=7). Logistic regression models were used to examine the association between state type (early vs. non-adopter), time, and their interaction on the proportion of major amputation.

Results: The study included 2,446 hospitalizations of patients living in rural areas (1,881 Medicaid beneficiaries, 1,044 early-adopter) and 27,292 hospitalizations of patients living in urban areas (20,018 Medicaid beneficiaries, 12,287 early-adopter). There was a 30% reduction in the number of hospitalizations for uninsured patients (urban: 27%, rural: 67% reduction) and 161% increase in the number of hospitalizations for Medicaid beneficiaries (urban: 166%, rural: 112% increase) living in both urban and rural areas in early-adopter states after expansion. For non-adopter states, there was a 60% and 77% increase in the number of hospitalizations for uninsured patients and Medicaid beneficiaries with CLTI, respectively.

Among Medicaid beneficiaries residing in urban areas, the odds of major amputation decreased 12% in early-adopter states (ORs 0.88, 95%CI 0.78,0.99, p=0.039) and increased 8% in non-adopter states (OR 1.08, 95%CI 0.97,1.19, p=0.160) (Figure). There was no significant change in odds of major amputation for patients living in rural areas in early-adopter (OR 0.85, 95%CI 0.59,1.23, p=0.383) and non-adopter states (OR 1.03, 95%CI 0.75, 1.40, p=0.866).

Conclusions: ACA expansion was associated with improving Medicaid coverage for urban and rural patients with CLTI. In early-adopter states, amputation rates decreased for CLTI, particularly among patients living in urban areas, likely due to access to care. Additional studies are needed to further outline the geographical disparities of ACA expansion on outcomes CLTI patients living in rural areas.

SCIENTIFIC SESSION ABSTRACTS continued



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K. Breathett: Nothing to disclose, **A. Arrington:** Nothing to disclose,
S. Knapp: Nothing to disclose, **J. Siracuse:** Nothing to disclose,
E. Calhoun: Nothing to disclose, **W. Zhou:** Nothing to disclose,
T. Tan: Nothing to disclose

15. Propensity Score Matched Analysis of One Year Outcomes of Transcarotid Revascularization with Dynamic Flow Reversal, Carotid Endarterectomy and Transfemoral Carotid Artery Stenting

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Objective: Initial studies showed no significant differences in perioperative stroke or death between TCAR and CEA and lower stroke/death rates after TCAR compared with transfemoral CAS(TFCAS). This study compares one-year outcomes of ipsilateral stroke or death after TCAR, CEA and TFCAS.

Methods: All consecutive patients undergoing TCAR, TFCAS and CEA between September 2016 and June 2019 were identified in the SVS VQI database. The latest follow up was March 2020. 1:1 propensity-score-matched analysis was performed for patients with available one-year stroke/death data on over 24 baseline variables for TCAR and CEA and for TCAR and TFCAS. Kaplan-Meier life-table methods and proportional hazard Cox regression analyses were used to evaluate 1-year ipsilateral stroke or death after TCAR vs. CEA (n=1,824 each) and between TCAR and TFCAS (n=2,154 each)

Results: The cohorts were well matched (Table). At one-year, no significant difference was observed in the adjusted risk of ipsilateral stroke or death between TCAR and CEA (5.1% vs.3.8%,HR (95% CI):1.22 (0.90-1.68),P=0.20) or between TCAR and TFCAS (4.5% vs.4.7% HR (95% CI):0.91(0.69-1.21,P=0.52) (Figure). No significant interaction was identified between the procedure and symptomatic status in predicting ipsilateral stroke or death at 1 year. In the TCAR and CEA matched cohorts, symptomatic patients had an adjusted incidence of ipsilateral stroke/death of 6.8% after TCAR vs.5.0% after CEA [HR (95%CI):1.42 (0.84-2.39), P=0.196]. In the TCAR and TFCAS matched cohort, symptomatic patients had an ipsilateral stroke/death incidence of 5.6% after TCAR vs. 7.0% after TFCAS [HR (95%CI): 1.13 (0.69-1.82), P=0.63].

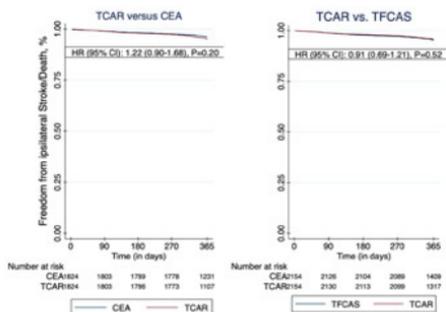
Conclusion: In this propensity-score matched analysis, no significant differences in one-year ipsilateral stroke free survival were observed between TCAR and CEA or between TCAR and TFCAS. The advantages of TCAR compared to TFCAS seem to be mainly in the peri-operative period, which makes it a suitable minimally invasive option for surgically high-risk patients with carotid artery stenosis. Larger studies, with longer follow up and data on restenosis are warranted before definitive conclusions can be made regarding the long-term benefits and durability of TCAR.

SCIENTIFIC SESSION ABSTRACTS continued

Table 1. Baseline Characteristics after Propensity Score Matching
TCAR and TFCAS

	TCAR and TFCAS			CEA and CEA		
	TFCAS (N=2,154)	TCAR (N=2,154)	Mean Standardized Difference*	CEA (N=1,824)	TCAR (N=1,824)	Mean Standardized Difference*
Median Age in years (IQR)	73 (67-79)	73 (67-79)	-0.001	74 (68-80)	74 (67-80)	-0.004
Categorical variables, N (%)						
Age ≥75 years	907 (42.1)	961 (44.6)	-0.051	871 (47.8)	892 (48.9)	-0.023
Female Gender	736 (34.2)	766 (35.6)	0.029	620(34.0)	643(35.2)	0.027
Non-White	185 (8.6)	207 (9.6)	0.036	184(10.1)	169(9.3)	0.028
Race						
Symptomatic Status	535 (24.8)	516 (24.0)	0.025	512(28.1)	517(28.3)	-0.006
<i>Aneurysm fugax</i>	93 (4.3)	76 (3.5)	0.041	79(4.3)	74(4.1)	0.014
<i>TIA</i>	182 (8.4)	182 (8.4)	<.001	170(9.3)	176(9.6)	-0.011
<i>Stroke</i>	290 (13.5)	297 (13.8)	-0.009	271(14.9)	282(15.5)	-0.017
Hypertension	1,918 (89.9)	1,952 (90.6)	0.025	1,658(90.9)	1,659(91.0)	0.002
Diabetes	840 (39.1)	811 (27.7)	0.031	672(36.8)	700(38.4)	0.032
Coronary artery disease	1,072 (49.8)	1,052 (48.8)	0.019	879 (48.2)	890 (48.8)	0.012
Prior CABG/PCI	900 (41.8)	893 (41.5)	0.007	726 (39.8)	749 (41.1)	0.026
Congestive heart failure	421 (19.6)	391 (18.2)	0.036	301 (16.5)	322 (17.7)	0.031
COPD	583 (27.1)	604 (28.1)	0.022	452 (24.8)	482 (26.4)	0.038
CKD	814 (38.7)	791 (37.6)	0.023	675 (37.6)	690 (38.7)	0.022
<i>Current Smoker</i>	505 (23.4)	513 (23.8)	0.021	386 (21.2)	416 (22.8)	0.080
Prior Ipsilateral CEA	395 (18.3)	408 (18.9)	0.016	202 (11.1)	198 (10.9)	0.007
Prior Ipsilateral CAS	42 (2.0)	37 (1.7)	0.017	19 (1.0)	19 (1.0)	-0.001
Prior Contra-lateral CEA/ CAS	371 (17.2)	350 (16.3)	0.026	309 (16.9)	304 (16.7)	0.007
Contralateral Occlusion	238 (11.8)	223 (10.8)	0.032	163 (8.9)	174 (9.5)	0.021
Preoperative Medications						
<i>Aspirin</i>	1,924(89.3)	1,917(89.0)	0.010	1,629(89.3)	1,621(88.9)	0.014
<i>21212-Receptor Antagonists</i>	1,838(85.3)	1,831(85.0)	0.009	1,527(83.7)	1,515(83.1)	0.018
<i>Statin</i>	1,908(88.6)	1,902(88.3)	0.009	1,634(89.6)	1,623(89.0)	0.020
<i>Beta Blockers</i>	1,222(56.8)	1,195(55.5)	0.025	1,064(58.3)	1,010(55.4)	0.059
<i>Anticoagulation</i>	291(13.5)	288(13.4)	0.004	217(11.9)	238(13.1)	0.035
<i>ACE Inhibitors</i>	1,125(52.2)	1,160(53.9)	0.033	1,002(54.9)	995(54.6)	0.008
<i>Annual Physicians' Gate Volume</i>			0.101			0.172
<i>Low</i>	631(29.3)	606(28.1)		642(35.2)	503(27.6)	
<i>Medium</i>	724(33.6)	825(38.3)		583(32.0)	690(37.8)	

Figure. Kaplan Meier Estimates of Freedom from Ipsilateral Stroke and Death in the Matched Cohort



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16. The Natural History of Moderate Carotid Artery Stenosis in a Large Community-Based Cohort and Implications for Carotid Surveillance Among Asymptomatic Individuals

Rebecca C. Gologorsky¹, Elizabeth Lancaster², Mai Nguyen-Huynh^{3,4}, Lue-Yen Tucker³, Kara Rothenberg⁵, Andrew Avins³, Hui Kuang⁶, Robert Chang^{7,3}. ¹University of California, San Francisco- East Bay, Oakland, CA, USA, ²University of California, San Francisco, San Francisco, CA, USA, ³Division of Research, Kaiser Permanente Northern California, Oakland, CA, USA, ⁴The Permanente Medical Group, Walnut Creek, CA, USA, ⁵University of California San Francisco- East Bay, Oakland, CA, USA, ⁶The Permanente Medical Group, San Francisco, CA, USA, ⁷The Permanente Medical Group, South San Francisco, CA, USA.

Objective: Moderate asymptomatic internal carotid artery stenosis is a poorly defined risk factor for ischemic stroke. In this study, we describe the long-term risk of stroke in an integrated healthcare system.

Methods: All adult patients with asymptomatic moderate internal carotid artery stenosis (50-69% per NASCET criteria) between 2008 to 2012 were identified, with follow-up through 2017. Asymptomatic stenosis was defined as no ipsilateral stroke within 6 months of inclusion or history of ipsilateral carotid intervention. The primary outcome was acute ischemic stroke (AIS) attributed to the carotid artery. Secondary outcomes included disease progression, ipsilateral intervention, ischemic events of another etiology, and long-term survival. Censoring occurred at time of intervention, death, or loss to follow-up.

Results: Overall, 11,614 arteries with moderate stenosis in 9,803 patients were identified. Mean age was 74.2±9.9 years with 51.4% female. Mean follow-up was 5.1±2.9 years. The overall mortality rate was 44.6%, with 10.5% of patients lost to follow-up. During follow-up there were 19,808 studies performed in 5,951 patients (60.7%), revealing stenosis progression in 1,674 (14.4%) arteries, including 1,614 (13.9%) progressing to severe stenosis, and 60 (0.5%) to occlusion. The mean time to stenosis progression was 2.6±2.1 years. Carotid intervention occurred in 708 arteries (6.1%). Of these, 66.1% (468/708) had progressed to severe stenosis. There were 180 (1.6%) AIS identified attributable to carotid disease (annual risk 0.31% [95%CI 0.21-0.41%]), of which thirty-one (17.2%) underwent subsequent intervention. After AIS, 29 (16.1%) patients died within 30 days, an additional 38 (21.1%) within 1 year, and 72 (40%) patients were alive at the end of follow-up. Of identified AIS, 50 (27.8%) arteries had progressed to severe stenosis or occlusion. Strokes caused by non-carotid etiologies were identified in 599 (5.2%) arteries.

SCIENTIFIC SESSION ABSTRACTS continued

Conclusions: In this community-based sample of patients with asymptomatic moderate internal carotid artery stenosis followed for 5 years, a minority of patients exhibit disease progression, and the yearly incidence of associated stroke is low. Future research is needed to optimize management strategies for this population.

Author Disclosures: **R. C. Gologorsky:** Nothing to disclose,
E. Lancaster: Nothing to disclose, **M. Nguyen-Huynh:** Nothing to disclose,
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A. Avins: Nothing to disclose, **H. Kuang:** Nothing to disclose,
R. Chang: Nothing to disclose

SCIENTIFIC SESSION ABSTRACTS continued

17. Economic Value of Podiatry Service in a Limb Salvage Alliance

Wei Zhou¹, Tze-Woei Tan², Naren Patel³, Allison Rottman¹, Craig Weinkauf¹, Jennifer Palppparlardo¹, Kaoru Goshima⁴, Andrew Rice¹. ¹University of Arizona, Tucson, AZ, USA, ²Tze-Woei Tan, Tucson, AZ, USA, ³Naren Patel, Tucson, AZ, USA, ⁴Kay Goshima, Tucson, AZ, USA.

Objective: Over the last decade, multidisciplinary “toe and flow” programs have gained great popularity with proven benefit in limb salvage. Many vascular surgeons have incorporated podiatrists into their practices. The Viability of this practice model requires close partnership, hospital support, financial sustainability. We intend to examine the economic values of podiatrists in a busy safety-net hospital in the Southwest United States.

Methods: An administrative database that captured monthly OR cases, clinic encounters, in-patient volume, and total work relative value units (wRVU) in an established limb salvage program in a tertiary referral center were examined. The practice has a diverse patient population with >30% of minorities. During a period of three years, there was a significant change in the number of podiatrists from 1 to 4 within the program where the number of vascular surgeons remained relatively stable.

Results: The limb salvage program experienced >100% of growth in total OR volumes, clinic encounters, and total wRVUs over a period of four years. A total of 31,145 patients were evaluated in a multidisciplinary limb salvage clinic and 4700 procedures were performed. The initial growth of clinic volume and operative volume ($P<0.01$) were attributed by the addition of vascular surgeons in year one. However, recruitment of podiatrists to the program significantly increase clinic and OR volume by an additional 57% and >60% respectively ($P<0.01$) in the last two years. With equal number of surgeons, podiatry contributes to 40% of total wRVUs generated by the entire program in 2019. Despite that most of the foot and ankle procedures that were regularly performed by vascular surgeons were shifted to the podiatrists, vascular surgeons continued to experience a significant increase (>20%) in operative volume and >40% of increase in wRVUs productions.

Conclusions: This study shows that the value of close collaboration between podiatry and vascular in a limb salvage program extends beyond a patient’s clinical outcome. Financial advantage of including podiatrist in a vascular surgery practice is clearly demonstrated.

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T. Tan: Nothing to disclose, **N. Patel:** Nothing to disclose,

A. Rottman: Nothing to disclose, **C. Weinkauf:** Nothing to disclose,

J. Palppparlardo: Nothing to disclose, **K. Goshima:** Nothing to disclose,

A. Rice: Nothing to disclose

18. **Familial Risk of Abdominal Aortic Aneurysm and Implications for Population Screening**

Claire L. Griffin, Jason P. Glotzbach, Josh J. Horns, Heidi Hanson, Benjamin S. Brooke. University of Utah, Salt Lake City, UT, USA.

Objectives: The likelihood of developing an abdominal aortic aneurysm (AAA) is known to be attributable to heritable risk factors, although the degree of familial risk has not been clearly defined. We sought to quantify the familial risk for AAA based on degree of relationship to a case, specifically first-degree relatives (FDR), second-degree relatives (SDR), and first cousins (FC) of patients diagnosed with AAA.

Methods: We performed a retrospective case-control study using the Utah Population Database to identify all patients diagnosed with AAA in the state of Utah between 1969 and 2019. Age and sex matched controls were identified for all AAA cases and their relatives in a ratio of 10:1. Patient age at time of AAA diagnosis was stratified into four categories (0-44, 45-54, 55-64, and >65 years). Non-proportional hazard modeling was used to estimate the familial risk for relatives of AAA patients as well as the effect of gender and age on AAA diagnosis.

Results: A total of 6968 cases were identified, of which 71.8% were male. There were 36,825 FDR; 107,291 SDR; and 99,818 FC with 2.8 million matched controls. The risk for AAA diagnosis was directly related to how closely an individual was related to a case, with a hazard ratio of 3.02 for FDR (2.75-3.31 95% CI, $p < 0.001$), 1.6 for SDR (1.42-1.72 95% CI, $p < 0.001$), and 1.3 for FC (1.26-1.42 95% CI, $p < 0.001$) (see Figure). Furthermore, the risk of diagnosis of AAA varied by age within the different relative types. Among individuals with a FDR, the risk of AAA diagnosis was significantly higher compared to age matched controls in both the 0-44 (HR 8.29, $p = 0.03$) and 55-64 age groups (HR 4.65 $P < 0.001$). Finally, there was a slightly lower risk of AAA diagnosis in the FDR of male versus female cases (HR 0.91, $p = 0.018$) that was not seen in other relative categories.

Conclusions: There is an incremental increase in risk of AAA based on degree of familial relationship and for FDR this varies by sex of the index case. Moreover, our data suggest that risk of AAA diagnosis for FDR occurs at much younger ages than what traditional screening captures. These findings have implications for population AAA screening programs which do not currently take familial risk into account.

Author Disclosures: C. L. Griffin: Nothing to disclose,

J. P. Glotzbach: Nothing to disclose, **J. J. Horns:** Nothing to disclose,

H. Hanson: Nothing to disclose, **B. S. Brooke:** Nothing to disclose

19. Gender Disparities in Presentation, Operative Characteristics, and Clinical Outcomes After Lower Extremity Bypass for Peripheral Artery Disease

Elizabeth M. Lancaster, Bian Wu, Joel L. Ramirez, James C. Iannuzzi, Michael S. Conte, Jade S. Hiramoto. University of California, San Francisco, San Francisco, CA, USA.

Objective: Despite data suggesting higher rates of functional decline and worse clinical outcomes in women compared to men after invasive treatment for peripheral artery disease (PAD), women are underrepresented in contemporary PAD studies. We used Vascular Quality Initiative (VQI) data to evaluate gender differences in presentation, treatment, and clinical outcomes after lower extremity bypass (LEB) for PAD.

Methods: Patients in the VQI database that underwent LEB for claudication or chronic limb threatening ischemia (CLTI) from 2010-2019 were included. Descriptive statistics and competing risks survival analyses were performed.

Results: 36,289 patients (33% female) underwent LEB during the study period. Compared to men, women were more likely to be older (mean [SD]:68 [12] vs 66 [11] years), black (21% vs 15%), and diabetic (53% vs 51%) ($p<0.001$ for all). Women were more likely to have preoperative ankle brachial index <0.40 (38% vs 30%, $p<0.001$) and CLTI compared to men (75% vs 71%, $p<0.001$) (Table 1); and less likely to have LEB to tibial/peroneal arteries (35% vs 44%, $p<0.001$) or a single segment vein graft (47% vs 54%, $p<0.001$).

Despite shorter operative times and less blood loss, women had longer hospital stays (mean [SD]: 6.4 [11.3] vs 5.8 [8.2] days, $p<0.001$) and higher rates of major adverse cardiovascular (CV) events compared to men (4.2% vs 3.7%, $p<0.001$) (Table 2). At discharge, women were less likely to be independently ambulatory (35% vs 42%, $p<0.001$), and less likely to be prescribed a statin (78% vs 82%, $p<0.001$) (Table 2). The overall 2-year cumulative incidence of major adverse limb event (MALE, major amputation, graft revision/thrombectomy, or occlusion) was 47.7% (95% CI 46.6-48.7%). In a hierarchical multivariable model including age, diabetes, race, renal failure, prior bypass, CLTI, and tibial/peroneal distal target, female gender was significantly and independently associated with MALE (HR 1.17 [95% CI 1.11-1.24]) (Figures 1,2).

Conclusions: Women undergoing LEB for PAD have more advanced disease at time of surgery, worse CV outcomes, and higher risk of MALE compared to men, despite having more proximal graft targets and shorter operative times. A better understanding of gender differences is critical for improving outcomes and providing optimal care for women with PAD.

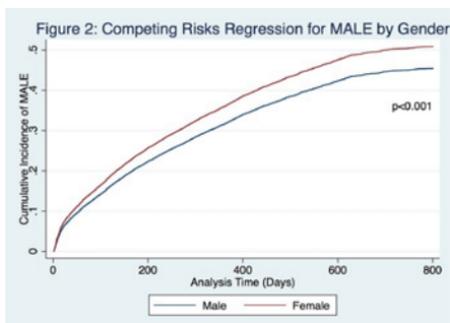
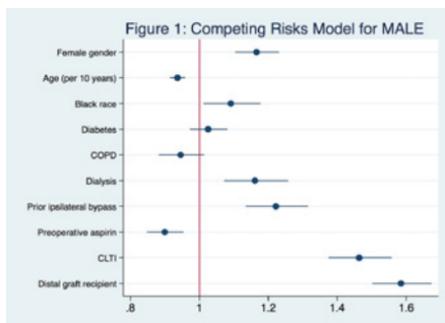
SCIENTIFIC SESSION ABSTRACTS continued

Table 1: Baseline patient characteristics

	Male (N=24,301)	Female (N=11,988)	p-value
Age in years, mean (SD)	66.3 (10.6)	67.7 (11.7)	<0.001
Black Race	3,729 (15%)	2,539 (21%)	<0.001
Current smoker	10,219 (42%)	4,445 (37%)	<0.001
Diabetes	12,325 (51%)	6,349 (53%)	<0.001
Hypertension	21,427 (88%)	10,736 (90%)	<0.001
Coronary artery disease	11,101 (46%)	4,553 (38%)	<0.001
Preoperative Statin	18,087 (75%)	8,545 (72%)	<0.001
Preoperative ABI <0.4	5,362 (30%)	33,95 (38%)	<0.001
Critical limb ischemia	17,014 (71%)	8,932 (75%)	<0.001

Table 2: Operative characteristics and short-term outcomes

Operative Characteristics	Male (N=24,301)	Female (N=11,988)	p-value
Tibial/peroneal graft recipient	10,610 (44%)	4,202 (35%)	<0.001
Single segment vein graft	13,202 (54%)	5,668 (47%)	<0.001
Operative time in minutes, mean (SD)	241 (113)	233 (111)	<0.001
Short-Term Outcomes			
Post-operative LOS in days, mean (SD)	5.8 (8.2)	6.4 (11.3)	<0.001
Death, MI, or stroke before DC	894 (3.7%)	507 (4.2%)	<0.001
Major adverse limb event before DC	1,371 (5.7%)	826 (6.9%)	<0.001
Independently ambulatory at DC	10,070 (42%)	4,153 (35%)	<0.001
Statin on DC	19,858 (82%)	9,307 (78%)	<0.001



Author Disclosures: **E. M. Lancaster:** Nothing to disclose, **B. Wu:** Nothing to disclose, **J. L. Ramirez:** Nothing to disclose, **J. C. Iannuzzi:** Nothing to disclose, **M. S. Conte:** Nothing to disclose, **J. S. Hiramoto:** Nothing to disclose

20. Impact of Perioperative Blood Transfusion in Anemic Patients Undergoing Infra-inguinal Bypass

Cali E. Johnson, Miguel F. Manzur, Alberto J. Ortega, Li Ding, Vincent L. Rowe, Fred A. Weaver, Gregory A. Magee. University of Southern California, Los Angeles, CA, USA.

Objective: Patients who present with lower extremity ischemia are frequently anemic and the optimal transfusion threshold for this cohort remains controversial. We sought to evaluate the impact of blood transfusion on major adverse cardiac events (MACE), including myocardial infarction, dysrhythmia, stroke, congestive heart failure, and 30-day mortality for these patients.

Methods: All consecutive patients who underwent infra-inguinal bypass at our institution from 2011-2020 were included. The primary outcome was MACE and blood transfusion was the primary exposure. Univariate and multivariable analyses were performed to assess the impact of patient and procedural variables, including red blood cell transfusion, stratified by hemoglobin (Hgb) nadir (<7, 7-8, >8 g/dL).

Results: Of the 287 patients reviewed for analysis, 146 (50.9%) were transfused (mean: 1.6 ± 3 units). Patients who received a transfusion had a mean nadir Hgb of 8.3 ± 1.0 g/dL, compared to 10.1 ± 1.7 g/dL without a transfusion. The overall incidence of MACE was 15.7% (45 of 287 patients). Univariate analysis demonstrated that MACE was associated with blood transfusion ($P = .009$), lower Hgb nadir ($P = .02$), higher blood loss ($P = .003$), higher baseline creatinine ($P = .02$), prior coronary revascularization ($P = .002$), non-ambulatory status ($P = .03$), ASA classification 4 or 5 ($P < .0001$) and preoperative P2Y12 antagonist ($P = .049$).

Transfusion was independently associated with MACE for patients with a Hgb nadir >8 (OR 3.09; $P = .006$), but not for patients with Hgb nadir 7-8 (OR 0.818; $P = .77$). The impact in the Hgb nadir < 7 group was inconclusive (Fig 1). The only other variables independently associated with MACE were prior coronary revascularization (OR 2.58, $P = .01$) and higher blood loss (OR 1.05; $P = .02$). Hospital length of stay for patients with MACE was significantly higher than for patients without (14.8 vs. 8.2 days, $P < .001$).

Conclusions: For patients undergoing infra-inguinal bypass, receiving a transfusion with a Hgb nadir >8 was associated with a 3-fold increase in MACE, with twice the length of stay. For patients with a Hgb 7-8, transfusion did not increase or reduce the incidence of MACE. These findings suggest no benefit of blood transfusion for patients with Hgb nadir >7 and harm for Hgb >8.

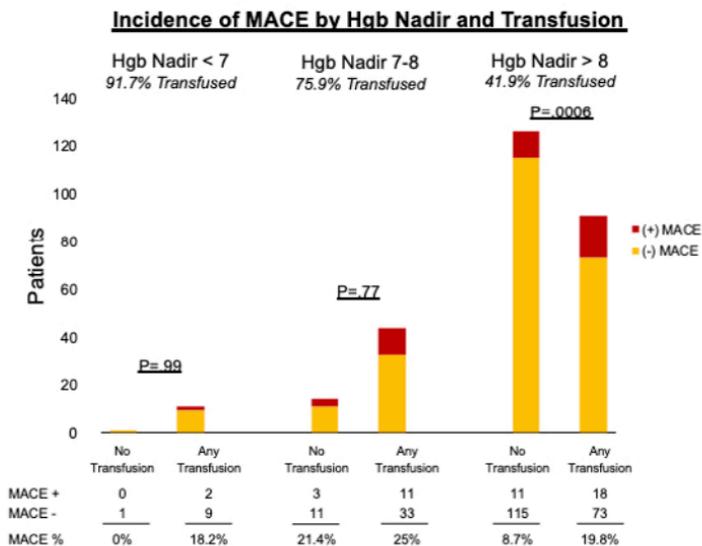


Fig 1. Incidence of MACE with transfusion, stratified by Hgb nadir.

Author Disclosures: **C. E. Johnson:** Nothing to disclose,
M. F. Manzur: Nothing to disclose, **A. J. Ortega:** Nothing to disclose,
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F. A. Weaver: Nothing to disclose, **G. A. Magee:** Nothing to disclose

21. Evaluation of a Novel Hydrogel Intravascular Embolization Agent in a Swine Model of Fatal Uncontrolled Solid Organ Hemorrhage and Coagulopathy

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Objective: Agents for intravascular embolization of traumatic hemorrhage are used off-label and their performance under differing coagulation conditions has been minimally studied. We explored the performance of a novel hydrogel in controlling hemorrhage in a unique animal model of severe solid organ injury and coagulopathy.

Methods: Anesthetized swine (n=36, 45+/-3 Kg) had laparotomy and splenic externalization. Half underwent 50% isovolemic hemodilution with 6% hetastarch and cooling to 33-35°C (COAG group). All had controlled 20mL/Kg hemorrhage and endovascular proximal splenic artery access with a 4Fr catheter via a right femoral sheath. Splenic transection and 5min bleeding were followed by treatment (n=5/group) with 5mL gelfoam slurry, three 6mm coils, 3mL hydrogel, or no treatment (n=3, control). Animals received 15mL/Kg plasma and were monitored for 6 hours.

Results: Coagulopathy was successfully established in COAG animals, with greater pretreatment blood loss (11.6+/-1.3 vs 7.3+/-0.7 mL/Kg, P=.006) and quicker death (176+/-26 vs 291+/-26 min, P=.003). All controls died within 100 min. Survival without coagulopathy was 5/5 for hydrogel, 4/5 for coil, and 3/5 for gelfoam. With coagulopathy, a single hydrogel animal survived with 2/4 deaths occurring in the final hour. In non-coagulopathic animals, hydrogel demonstrated improved survival time (P<.001) and post-treatment blood loss (1.46+/-0.8 mL/Kg) over controls (18.8+/-0.7, P.001) and blood loss not significantly different from gelfoam (4.7+/-1.3) and coils (4.6+/-1.5). In coagulopathic animals, hydrogel had improved survival time over control (P=.003) and gelfoam (P=.032) and was equivalent to coils. Hydrogel had decreased blood loss (4.2+/-0.8 mL/Kg) compared to control (20.4+/-4.2, P=.003) and gelfoam (14.9+/-5.0, P=.043) and was not significantly different from coils (8.3+/-2.4). Hydrogel treatment in coagulopathy raised MAP to a greater degree than coils or gelfoam with minimal rebleeding.

SCIENTIFIC SESSION ABSTRACTS continued

Conclusion: Hydrogel demonstrated equivalent hemorrhage control performance to standard treatments under non-coagulopathic conditions and improved performance with dilutional coagulopathy. This agent should be explored as a potential preferable treatment for the embolization of traumatic solid organ and other injuries.

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M. D. Prince: Nothing to disclose, **A. Voekler:** Nothing to disclose,

B. S. Kheirabadi: Nothing to disclose, **M. A. Dubick:** Nothing to disclose

22. A Comparison of Outcomes Between Open and Endovascular Arteriovenous Access Creation for Hemodialysis

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Objective: Preliminary outcomes for percutaneous endovascular autogenous access (endoAVF) have shown promising results; however, comparisons with surgical cohorts in dialysis populations are lacking. This study compares autogenous arteriovenous access created with the EverlinQ endoAVF system with accesses created by conventional surgical technique with respect to functional and patency related outcomes.

Methods: This is a multicenter, retrospective review of autogenous arteriovenous accesses entered into a prospective database. Patients receiving radiocephalic, brachiocephalic, or endoAVF arteriovenous accesses between 2014 -2019 were included. Autogenous access maturation, primary patency, secondary patency, steal syndrome, and re-interventions were collected and analyzed using standard statistical and survival analyses.

Results: A total of 369 accesses were created during the study period, including 61 endovascular accesses, 171 radiocephalic accesses, and 137 brachiocephalic accesses (Median follow-up 17 months; range 0 - 71 months). Maturation failure at the end of follow-up was 26.5±6%, 27.0±5%, and 18.4±4% for endovascular, radiocephalic, and brachiocephalic accesses, respectively (p = 0.049 for brachiocephalic vs. endovascular accesses). Primary patencies at 12 and 24 months were 42±5% and 32±7% for endovascular accesses, 43±4% and 24±4% for radiocephalic accesses, and 42±4% and 29±4% for brachiocephalic accesses (p =NS). Secondary patencies at 12 and 24 months were 68±6% and 61±7% for endovascular accesses, 75±3% and 67±4% for radiocephalic accesses, and 87±3% and 81±4% for brachiocephalic accesses (p = 0.019 for brachiocephalic vs. endovascular accesses). There were no statistically significant differences in ischemic steal syndrome (3.3%, 4.1% and 8.0%; p = 0.229) or total reinterventions/year (0.8±2.0, 0.9±1.6, and 1.2±1.7; p = 0.120) for endovascular, radiocephalic, or brachiocephalic arteriovenous accesses, respectively.

Conclusions: EndoAVF compare favourably with respect to maturation and patency compared with surgically created accesses in a real-world cohort. Outcomes and reintervention rates are similar to conventional radiocephalic arteriovenous accesses, but are inferior with respect to patency and maturation to brachiocephalic accesses.

Author Disclosures: A. Mordhorst: Nothing to disclose,

J. Clement: Nothing to disclose, **Y. Hsiang:** Nothing to disclose,

J. Faulds: Nothing to disclose, **J. Misskey:** Nothing to disclose

23. Safety and Efficacy of Robotic First Rib Resection with Adjuvant Endovascular Therapy for Venous Thoracic Outlet Syndrome

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Objective: Venous thoracic outlet syndrome (vTOS) care is accomplished by a combination of endovascular therapy (EVT) and first rib resection (FRR). For the latter, an open (O-FRR) or robotic-assisted transthoracic approach (R-FRR) can be performed. R-FRR entails smaller incisions and offers an unmatched view of the first rib (**Fig 1A**). This study aims to compare the acute and mid-term results of R-FRR vs O-FRR for vTOS.

Methods: A single center, retrospective analysis identified patients undergoing either O-FRR or R-FRR for vTOS from 2015-2019. Safety and efficacy perioperative variables were analyzed. Moreover, functional evaluation of the subclavian vein was performed by serial duplex.

Results: Forty-one patients (O-FRR=18 [44%] vs R-FRR=23 [56%]; mean age 30.8±12.2 years; 65% male; mean follow up 8.7, range 1-45 months) were included. 35 patients were treated for thrombotic and 6 for non-thrombotic syndromes. Preoperative venography and angioplasty +/- clot removal were performed in 12 (66.6%) of the O-FRR and 18 (78.2%) of the R-FRR. Intraoperatively, there was a trend for shorter procedural time (211.1±17.3 vs 183.6±76.9 min, p=0.2) with significantly less blood loss (32.6 vs. 115.8 ml, p<0.001) in the R-FRR cohort. Post-operatively, R-FRR had significantly lower hospital length-stay (1.7±0.5 vs 2.8±1.5 days, p<0.001), and in-hospital normalized morphine use (27±5.7 vs 79.8±15.8mg, p=0.02). The overall need for post-operative clinically-driven unplanned EVT occurred in 18 (43.9%) patients (O-FRR=33.4% [n=6] vs R-FRR=52.1% [n=12], p=0.2). The driver of such interventions was 10 (55.5%) persistent stenosis (O-FRR=16.6% [n=1] vs R-FRR=75% [N=9], p=0.01), and 8 (44.4%) occlusions (O-FRR=83.3% [n=5] vs R-FRR=25% [N=3], p=0.01). Comparative pre-operative vs mean 8.7 months duplex showed significant patency improvement in all groups (O-FRR: p=0.01, R-FRR: p=0.03) (**Fig 1B-C**). There was persistent venous occlusion despite therapy in 3 patients (O-FRR=5.5% [n=1] vs R-FRR=8.6% [n=2], p=0.4). Clinical outcomes showed no difference between groups on last visit (**Fig 1D**).

SCIENTIFIC SESSION ABSTRACTS continued

Conclusion: R-FRR in conjunction with clinically-driven pre +/- post-operative EVT is associated with favorable peri-operative outcomes when compared to open surgery, particularly in reducing blood loss, pain, and hospital stay.

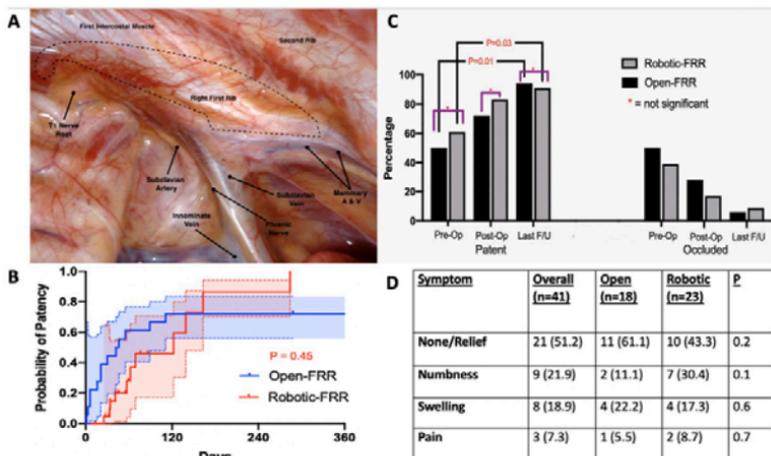


Figure 1 Safety and efficacy of Robotic First Rib Resection (R-FRR) with adjuvant endovascular therapy for venous thoracic outlet syndrome. **(A)** Transthoracic view of the first rib. **(B)** Kaplan-Meier analysis of subclavian vein (SCV) patency between groups over time. **(C)** Cross-sectional comparison of SCV patency and occlusions by pre-, post-operative, and last follow-up duplex. **(D)** Symptom free duration at last clinic visit.

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24. Preoperative Thrombolysis Affords Significant Benefit in Patency and Outcome Following First Rib Resection in Acute Paget-Schroetter Syndrome (PSS)

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Objective: Spontaneous thrombosis of the subclavian vein (PSS) has long been managed with anticoagulation alone. Definitive benefits of thrombolysis in the acute period (first 2 weeks post thrombosis) over anticoagulation have not been well reported. Our goal was to compare patients managed with early thrombolysis followed by anticoagulation and first rib resection (FRR) to anticoagulation and FRR using vein patency by venography and standardized outcome measures.

Methods: We reviewed a prospectively collected database from 2000 to 2019. Two groups were compared: those managed with acute (within 2 weeks of onset) thrombolysis at our institution (Lysis) and those managed with anticoagulation alone (NoLysis). All patients underwent FRR. Venography was routinely performed both pre- and post-FRR. Standardized outcome measures included Quick Disability of Arm, Shoulder and Hand (QuickDASH) scores and Somatic Pain Scale (SPS).

Results: One hundred subjects were identified: 50 Lysis vs 50 NoLysis. There was no difference in age (31.4 vs 35.7; $p=0.07$), male gender (44 vs 54%) or laterality (Right 74 vs 72%). On venography prior to FRR, thrombolysis resulted in patency of 86% of Lysis veins, whereas 76% of NoLysis veins were patent. Following FRR, post-op venography with interventions resulted in a significantly greater final vein patency rate for Lysis compared to NoLysis (94 vs 72%; $p=0.006$). Follow-up averaged 227 (Lysis) vs 276 days (NoLysis). Final QuickDASH scores were significantly improved (lower) for Lysis (6.6 vs 16.0; $p=0.049$), but SPS was not significantly different (0.2 vs 0.5; $p=0.37$). Subgroup analysis showed that Lysis had a significantly higher final vein patency rate among physically active patients (97 vs 70%; $p=0.039$) and a trend towards a better QuickDASH scores (7.1 vs 10.7; $p=0.57$) [Table 1].

Conclusions: Thrombolysis as initial management of PSS, while not uniformly successful in establishing patency pre FRR, resulted in improved final vein patency and improved QuickDASH scores. Thrombolysis should be the management of choice in the setting of acute spontaneous subclavian vein thrombosis (PSS).

SCIENTIFIC SESSION ABSTRACTS continued

Table 1. Summary of Results

	All (n=100)	Lysis (n=50)	NoLysis (n=50)	p-value
Pre-FRR Vein Patency, (%)	81 (81)	43 (86)	38 (76)	0.31
Post-FRR Venogram, (%)				
<i>Re-canalization + Angioplasty</i>	18 (18)	17 (34)	1 (2)	0.0001
<i>Angioplasty alone</i>	53 (53)	22 (44)	31 (62)	0.11
<i>No Intervention</i>	12 (12)	8 (16)	4 (8)	0.36
<i>Failed re-canalization</i>	17 (17)	3 (6)	14 (28)	0.006
Final Vein Patency, (%)	83 (83)	47 (94)	36 (72)	0.006
Final Quick DASH Score, (SD)	11.8 ± 16	6.6 ± 13	16.0 ± 17	0.049
SPS Score, (SD)	0.3 ± 1.3	0.2 ± 1.3	0.5 ± 1.2	0.37

Author Disclosures: **T. T. Chun:** Nothing to disclose,
J. B. O'Connell: Nothing to disclose, **D. A. Rigberg:** Nothing to disclose,
B. G. DeRubertis: Nothing to disclose,
J. C. Jimenez: Boston Scientific: Consultant, Smith and Nephew: Consultant,
S. M. Farley: Nothing to disclose, **D. T. Baril:** Nothing to disclose,
H. A. Gelabert: Nothing to disclose

25. Early Recognition of Venous Ulcer Improves Healing Rates and Resource Utilization

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Objective: Venous insufficiency is often not readily recognized as a contributing etiology to non-healing wounds by non-vascular surgery specialists, and thus, potentially delaying appropriate treatment to achieve wound healing and increasing health care costs. The objective of this study is to understand the time and resources used prior to definitive treatment of venous ulcers.

Methods: A single-institution retrospective chart review of CEAP6 patients undergoing radiofrequency saphenous and perforator vein ablation (RFA) between May 2016 and January 2018 identified 56 patients with 67 diseased limbs. Numbers of inpatient, ER, and wound care visits, and time to vein ablation from initial evaluation of the ulceration by a healthcare provider were collected. Demographics, comorbidities, wound characteristics, duplex imaging, and available wound healing follow-up through July 2018 were assessed in all patients.

Results: Of the 67 limbs examined, there were 588 total healthcare visits for wound assessment prior to seeing a vascular surgeon, with 413 visits from a wound care center (70% of all visits). (Table 1) Other specialty visits included emergency medicine (17.9% of limbs) and rheumatology (22.4% of limbs). Six patients (9 limbs) were admitted to inpatient services for their ulceration. Overall, patients were seen an average of 8.6 ± 9.7 times for their ulcer with the wound center prior to determination of contributing venous etiology and subsequent treatment. These visits translated to a median of 230 days (Q1=86.5, Q3=1088) between first identification of the ulcer by healthcare providers and subsequent accurate diagnosis and definitive treatment of their venous disease with RFA. After intervention, 18.64% of limbs were healed at 1 month, 33.92% were healed at 3 months, 50% were healed at 6 months, and 82.92% were healed by 12 months. (Figure 1)

Conclusions: Educating healthcare providers on accurate diagnosis of venous contribution to ulcers and subsequent appropriate treatment of venous etiologies of wound formation can significantly improve healing and minimize resources.

SCIENTIFIC SESSION ABSTRACTS continued

Author Disclosures: **M. Kiguchi:** Medtronic: Speakers Bureau,
K. Reynolds: Nothing to disclose, **G. Biagetti:** Nothing to disclose,
K. Knoles-Barnett: Nothing to disclose, **I. Naz:** Nothing to disclose,
A. Alfawaz: Nothing to disclose, **J. Fatima:** Nothing to disclose,
S. D. Abramowitz: Nothing to disclose, **E. Y. Woo:** Nothing to disclose

26. Outcomes of Endovascular-first VS Bypass-first Approach for Patients with Chronic Limb-threatening Ischemia Using a Medicare-linked Database

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Objective: Chronic limb threatening ischemia (CLTI) is increasing in prevalence, and remains a significant cause of limb loss and disability and a strong predictor of cardiovascular mortality. Previous studies demonstrated that endovascular and open repair were similarly effective. These findings led to a significant increase in the adoption of the less-invasive endovascular-first approach. However, it remains unknown whether the two treatment modalities have similar durability in today's real-world setting. The aim of this study is to compare mid-term outcomes of endovascular-first and bypass-first strategies in patients with CLTI.

Methods: We identified all patients who underwent limb revascularization between January 2010 and December 2016 in the VQI-Medicare-linked database. Patients with a history of prior revascularization and those who had hybrid or supra-inguinal procedures were excluded from the study. The remaining patients were divided into two groups: endovascular-first (EVF) vs bypass-first (BF). Main endpoints included 2-year limb salvage, freedom from reintervention, amputation-free survival (AFS), and freedom from all-cause mortality (ACM).

Results: EVF approach was applied to 12,062 (70%) patients and BF approach to 5,166 (30%) patients. Median follow-up was 32 months (IQR 14-48). Patients in the EVF group were older, had more comorbidities and tissue loss. At 2-years, BF group achieved higher rates of limb salvage (86.4% vs. 82.1%, $P<0.001$), freedom from reintervention (72% vs. 68%, $P<0.001$), AFS (66.9% vs. 56.3%, $P<0.001$) and freedom from ACM (75.7% vs. 66.1%, $P<0.001$) (Figure 1). After adjusting for potential confounders, an impact of the treatment strategy on limb salvage [aHR(95%CI): 1.05(0.96-1.16), $p=0.25$], reintervention [aHR(95%CI): 0.92(0.84-1.003), $p=0.06$], AFS [aHR(95%CI): 0.96(0.91-1.015), $p=0.16$] and ACM [aHR(95%CI): 0.94(0.89-1.004), $p=0.06$] was not observed (Table1).

SCIENTIFIC SESSION ABSTRACTS continued

Conclusion: The current study is the largest real-world analysis showing noninferiority of endovascular-first approach in patients with CLTI based on similar limb salvage, durability, AFS and ACM compared to bypass. However, level 1 evidence on the role of revascularization strategy in these challenging patients is needed.

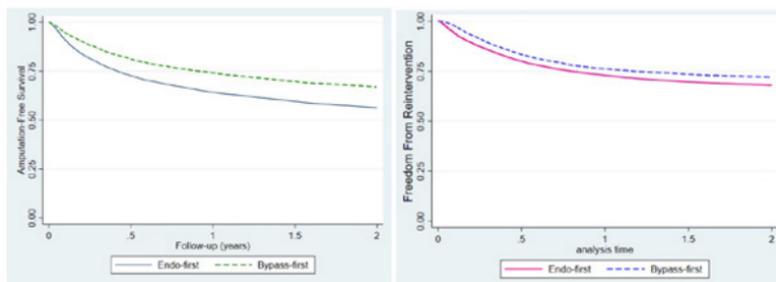


Figure 1: AFS and freedom from reintervention by treatment strategy

Table 1: Main outcomes by treatment strategy, Endovascular-first vs. Bypass-first

2-year outcome	Endo-first N=12,062 (70%)	Bypass-first N=5,166 (30%)	p-value	aHR(95%CI)	p-value
Amputation-free survival	56.30%	66.87%	<0.001	0.96(0.91-1.015)	0.16
Limb salvage	82.10%	86.40%	<0.001	1.05(0.96-1.16)	0.25
Freedom from reintervention	68.00%	72.00%	<0.001	0.92(0.84-1.003)	0.06
Freedom from ACM	75.70%	66.10%	<0.001	0.94(0.89-1.004)	0.06

Author Disclosures: **A. Mathlouthi:** Nothing to disclose, **I. Naazie:** Nothing to disclose, **C. Cui:** Nothing to disclose, **N. Samy:** Nothing to disclose, **O. Al-Nouri:** Nothing to disclose, **M. B. Malas:** Nothing to disclose

27. Center-level Variability in Management and Intervention for Claudication in the Veterans Health Administration

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Objective: Despite guidelines recommending intervention for lifestyle-limiting claudication only after a failed trial of medical and exercise therapy, prior work has shown significant variation in treatment algorithms and timing of intervention among physicians. This study evaluates variation in the management of claudication between centers within the Veterans Health Administration (VHA).

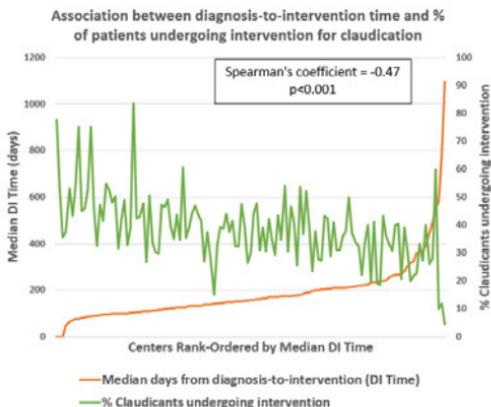
Methods: This is an observational cohort study of VHA patients diagnosed with claudication (2003-2014). Center-level outcomes were assessed through 2017, including: median diagnosis-to-intervention time (DI time), percentage undergoing intervention (% INT), and prescription of optimal medical therapy (OMT; both antiplatelet and statin agents). Centers were divided into quartiles by median time of diagnosis-to-first event (intervention, death, or study end). Quartile differences in center-level outcomes were assessed by global *F* test of center ID fixed effects in linear regression. Spearman correlation was calculated to evaluate the hypothesis that centers with lower intervention % would have longer diagnosis-to-intervention time. Smoking status and prescription of OMT, cilostazol, and high dose statin were compared among quartiles using one-way ANOVA.

Results: A total 25,737 patients at 130 centers were diagnosed with claudication. During follow up 9,052 patients (35.2%) at 127 centers underwent intervention: 14.2% of interventions occurred ≤ 30 days from diagnosis, 32.9% ≤ 90 days, and 53.1% ≤ 180 days. Median DI time and % INT varied significantly between center quartiles (both $p < 0.001$). However, medical management was uniform across all quartiles with ~65% of patients prescribed OMT ($p=0.38$) and ~50% active smokers at the time of intervention ($p=0.11$) [Table 1]. As hypothesized, there was an inverse relationship between % INT and median DI time (Spearman's coefficient = -0.47; $p < 0.001$) [Figure 1].

Conclusion: There is significant variability in adherence to guideline recommended management of claudication within the VA system. Opportunity for quality improvement exists to standardize medical and surgical treatment algorithms. Further research is necessary to ascertain how early intervention affects limb outcomes such as reintervention and amputation.

SCIENTIFIC SESSION ABSTRACTS continued

	Earlier Intervention		Later Intervention		
Patient-level analysis	Quartile 1 (N patients = 4,159)	Quartile 2 (N patients = 5,543)	Quartile 3 (N patients = 6,832)	Quartile 4 (N patients = 9,203)	p-value
Time from diagnosis-to-event*, median days (IQR)	807 (111, 1899)	1,077 (208, 2088)	1,289 (329, 2340)	1,610 (750, 2687)	<0.001
Proportion undergoing intervention, n (%)	2,014 (48.4%)	2,268 (40.9%)	2,492 (36.5%)	2,278 (24.8%)	<0.001
Time from diagnosis-to-intervention, median days (IQR)	107 (44, 297)	155 (65, 426)	189 (72, 596)	237 (84, 764)	<0.001
Center-level analysis	Quartile 1 (N centers = 33)	Quartile 2 (N centers = 33)	Quartile 3 (N centers = 32)	Quartile 4 (N centers = 32)	
Proportion undergoing intervention, mean % (SD)	53.3% (14.1)	39.6% (9.8)	35.1% (5.9)	24.9% (10.0)	<0.001
Prescription, mean % (SD)					
Optimal Medical Therapy	68.7 (10.1)	67.2 (8.3)	65.9 (7.0)	64.9 (11.0)	0.38
Antiplatelet agent	86.5 (6.4)	84.3 (5.8)	82.9 (7.0)	81.5 (8.7)	0.03
Statin agent	77.4 (9.3)	76.9 (6.3)	76.7 (4.5)	76.2 (10.6)	0.95
High dose statin agent	9.1 (5.0)	13.0 (5.4)	11.6 (5.1)	10.1 (6.2)	0.02
Cilostazol	16.7 (19.1)	19.8 (16.3)	20.0 (14.7)	13.5 (10.3)	0.29
*event is the first occurrence of either intervention, death, or study end					



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R. Chen: Nothing to disclose, **A. Kashikar:** Nothing to disclose,
N. B. Barreto: Nothing to disclose, **A. Langston:** Nothing to disclose,
A. W. Trickey: Nothing to disclose, **J. T. Lee:** Nothing to disclose,
S. Arya: Nothing to disclose

28. The Global Limb Anatomic Staging System (GLASS) Predicts Clinical Outcomes in Chronic Limb Threatening Ischemia

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Objective: The Global Limb Anatomic Staging System (GLASS) has recently been proposed to facilitate clinical decision-making in revascularization options in chronic limb threatening ischemia (CLTI). The purpose of this study was to define its relationship to treatment outcomes in CLTI.

Methods: Consecutive angiograms performed at a single institution for CLTI between April 2017 and July 2019 were retrospectively reviewed. Subjects with significant aorto-iliac disease, prior infrainguinal stents or functioning bypass grafts were excluded. GLASS score was assigned based upon pre-intervention angiograms and the treating surgeon determined the infrapopliteal target artery pathway (TAP) for the limb at risk. Demographic data, procedural details, and clinical outcomes were analyzed.

Results: This cohort consisted of 167 patients and 194 limbs, of which 175/194 (90%) presented with tissue loss and 149/182 (83%) with Wound, Ischemia and foot Infection (WIFI) Stage 3 or 4 disease. GLASS stages were 14% GLASS 1, 18% GLASS 2, and 68% GLASS 3. GLASS 3 anatomy was present in 85% of 52 limbs treated by bypass vs. 55% of 108 limbs that underwent endovascular interventions (ENDO; $p < 0.001$). Revascularization was not performed in 34 limbs, the majority of which were GLASS 3 (85%). GLASS 3 was associated with a higher rate of ENDO immediate technical failure (i.e., failure to re-establish TAP) than GLASS 1-2 (30% vs. 2%; $p < 0.001$). After a median follow-up of 10 months, limb-based patency (LBP) post-ENDO was significantly lower in GLASS 3 vs. GLASS 1-2 limbs ([Figure 1](#); $n=108$; $p=0.018$). GLASS stage 3 was associated with a reduced major adverse limb event-free survival (MALE-FS) in both the ENDO group and the overall revascularized cohort ([Figure 2](#); $n=160$; $p=0.001$). GLASS 3 was also associated with a decreased survival, amputation-free survival, and reintervention and amputation-free survival ([Table 1](#)). In a Cox proportional hazards model, GLASS 3 (HR=2.35[1.30-4.24]; $p=0.005$) and the Wound component of WIFI (HR=2.64[1.26-5.53]; $p=0.010$) were independent predictors of MALE-FS events after revascularization.

Conclusions: Pre-procedure angiographic GLASS stage 3 is an independent and significant predictor of major adverse clinical outcomes in patients with CLTI.

SCIENTIFIC SESSION ABSTRACTS continued

Log-rank comparison of clinical outcomes in patients with CLTI undergoing revascularization

Events, No. (%)	Overall (n=160)			ENDO (n=108)		
	GLASS 1-2 (n=57)	GLASS 3 (n=103)	<i>p</i> - value	GLASS 1-2 (n=49)	GLASS 3 (n=59)	<i>p</i> - value
Mortality	7 (12%)	30 (29%)	0.014	7 (17%)	19 (32%)	0.03
Major amputation	6 (11%)	18 (17%)	0.18	5 (10%)	11 (19%)	0.18
Amputation-free survival	12 (21%)	44 (43%)	0.004	11 (22%)	28 (47%)	0.007
Major adverse limb events	9 (16%)	28 (27%)	0.055	7 (14%)	16 (27%)	0.061
MALE-FS	15 (26%)	53 (51%)	0.001	13 (27%)	32 (54%)	0.002
Re-intervention amputation-free survival	22 (39%)	62 (60%)	0.008	19 (39%)	39 (66%)	0.011
Limb-based patency	N/A	N/A	N/A	20 (41%)	34 (58%)	0.018

Author Disclosures: **R. El Khoury:** Nothing to disclose,
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E. M. Lancaster: Nothing to disclose, **J. S. Hiramoto:** Nothing to disclose,
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29. Peripheral Artery Disease is Associated with Lower Extremity Vascular Interventions and Death After Renal Transplant

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Objective: Given the known associations between renal dysfunction and peripheral artery disease (PAD), the objective was to determine the incidence of and risk factors for lower extremity vascular procedures (LEVP) after renal transplant and to investigate the relationship between PAD and patient survival.

Methods: A retrospective study of 270 patients who underwent renal transplant from 1/2013-12/2013 was performed. Demographic data and clinical outcomes were collected from the electronic medical record. LEVP was defined as open or endoluminal revascularization, amputation, or debridement for lower extremity ischemia.

Results: The mean age was 52.7 ± 13.8 years, and 172/270 (64%) were men. Median follow-up was 6.0 years (IQR 4.6-6.5). Prior to transplant, 23/270 (8.6%) had a diagnosis of PAD and 3/270 (1.1%) had documented ankle-brachial indices. Patients with PAD were significantly more likely to have a history of type II diabetes mellitus (T2DM) and coronary artery disease (CAD) compared to those without PAD (Table 1). 14/270 (5.2%) underwent ≥ 1 LEVP after renal transplant, and 10/14 (71%) had ≥ 2 LEVPs. 6/14 (43%) had no pre-transplant diagnosis of PAD. 10/14 (71%) had an amputation, of which 5 were major amputations. 5/14 (36%) underwent a revascularization procedure (3 endoluminal, 2 open), 2 of whom ultimately had a major amputation. In a multivariate logistic regression model including race, PAD, CAD, and T2DM, black race [OR 4.2 (1.02-17.4), $p=0.046$], pre-transplant PAD [OR 12.2 (2.9-50.2), $p=0.001$], and CAD [OR 8.4 (2.0-35.5), $p=0.003$] were significantly associated with post-transplant LEVP (Figure 1). PAD was a significant predictor of worse overall survival in univariate analysis [HR 2.8 (1.1-6.8), $p=0.02$] (Figure 2). Patients with post-transplant LEVP were significantly more likely to have a major adverse cardiovascular event (stroke, myocardial infarction, coronary intervention, death) compared to those without [7/14 (50%) vs. 36/256 (14%), $p=0.001$].

Conclusions: A pre-transplant diagnosis of PAD is associated with increased risk of post-transplant LEVP and death. There is a severe lack of pre-transplant evaluation for PAD in this patient population. Routine evaluation may aid in the timely diagnosis of limb threatening ischemia and reduce patient morbidity and mortality.

SCIENTIFIC SESSION ABSTRACTS continued

Table 1. Descriptive and demographic data in relation to pre-transplant PAD status

	PAD = No (n=245)	PAD = Yes (n=23)	p-value
Age (years; mean±SD)	52.2 ± 14.0	57.7 ± 10.9	0.07
Sex = Male	155/244 (63%)	16/23 (69%)	0.56
Race = Black	33/244 (13%)	6/23 (26%)	0.10
Hemodialysis	147/244 (60%)	19/23 (83%)	0.09
Hypertension	232/245 (95%)	22/23 (96%)	0.90
Hyperlipidemia	139/241 (58%)	13/21 (62%)	0.71
Type 2 Diabetes Mellitus	71/245 (29%)	21/23 (91%)	<0.001
Coronary Artery Disease	47/245 (19%)	11/23 (48%)	0.001
Smoking History	96/242 (40%)	13/23 (56%)	0.12

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H. J. Braun: Nothing to disclose, **D. Amara:** Nothing to disclose,

P. G. Stock: Nothing to disclose, **J. S. Hiramoto:** Nothing to disclose

30. A Single Center's 15-Year Experience with Palliative Limb Care for Critical Limb Ischemia in Frail Patients

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Objective: Our institution's multidisciplinary program Prevention of Amputation in Veterans Everywhere (PAVE) allocates veterans with critical limb threatening ischemia (CLTI) to immediate revascularization, conservative, primary amputation or palliative limb care based on previously published criteria. These four groups align with the approaches outlined by the Global Guidelines for management of CLTI. The goal of the current study is to delineate the natural history of the palliative group of patients, and quantify procedural risks and outcomes.

Methods: Veterans prospectively enrolled into the palliative limb cohort of our program between January 2005 and January 2020 were analyzed. The primary outcome was mortality. Secondary outcomes included limb related readmissions, limb loss and wound healing. Clinical Frailty Score (CFS), and both 30-day and 5-year expected mortalities were calculated using Veteran Association's Quality Enhancement Research Initiative (VA QUERI) tool.

Results: The PAVE program enrolled 1158 limbs over 15 years. 157 (13.5%) limbs in 146 patients were allocated to the palliative care-all presenting with tissue loss and varying degrees of infection and severe ischemia; 64% WiFi Stage 4, 18% Stage 3, 10% Stages 1-2. The overall mortality of the group was 89.5% (median 3 months from enrollment; range 0-91 months). The predicted average 30-day mortality was 34% and the expected 5-year mortality for the group was 66%. The average frailty score of the group was 6.3, denoting someone who is moderately to severely frail. Limb-related readmissions occurred an average of 0.3 times (range 0-4); eventual amputation was necessary in 18 (11.5%) limbs. Wound healing occurred in 30 patients (19.6%), 6 of whom are still alive.

Conclusions: Despite their severe ischemia at presentation, this group carries a high procedural risk profile, low survival curves and a low risk of limb related complications leading to deferred primary amputation. In our cohort the vast majority of patients died within a few months of enrollment with their limb intact. The VA QUERI 5-year mortality tool underestimated the actual mortality. A comprehensive approach to the management of CLTI patients should include a palliative limb care option as these patients have limited survival and can avoid unnecessary amputation.

SCIENTIFIC SESSION ABSTRACTS continued

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B. V. Leong: Nothing to disclose, **A. Murga:** Nothing to disclose,
B. Caputo: Nothing to disclose, **S. T. Patel:** Nothing to disclose,
A. Abou-Zamzam: Nothing to disclose, **T. Teruya:** Nothing to disclose,
C. Bianchi: Nothing to disclose

31. Endovascular Therapy for CLTI Patients with Chronically Occluded Bypass Yield Similar Long-term Outcomes as De-novo Endovascular Recanalization

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Objective: Evidence assessing endovascular therapy (EVT) versus re-do open revascularizations for chronically occluded bypasses is suboptimal. Comparative outcomes to EVT first-line procedures also remain uncertain. This study aims to evaluate EVT as a first-line approach for chronic-limb threatening ischemia (CLTI) after a chronically occluded bypass.

Methods: A single-center, retrospective review of patients who underwent EVT for CLTI between 2016-2019 was performed. Patients were categorized as EVT after failed bypass (aBP) or de-novo EVT (dnER) groups. Primary outcomes included 30-day major amputation (AMP) and target lesion revascularization (TLR). Secondary outcomes included intra-operative safety parameters, and 2-year major adverse limb events (MALE), limb salvage, and survival. Kaplan-Meier analysis was used for comparison.

Results: A total of 256 infra-inguinal interventions in 128 patients (aBP=41.5% vs dnER=58.5%) were analyzed. Mean age was 70.1±10.6 years (male=65.6%), 50% of patients were WIfI stage 3/4 (P=0.59). Retrograde access was used in 53.9% of patients (aBP=58.5% vs dnER=50.6%, P=0.38). Of all aBP recanalizations, 64.1% were rescued by treating the native circulation. Overall, the aBP group had a higher TLR (9.4% vs 4%, P=0.2), but lower AMP (0% vs 2.73%, p=0.23) 30-day rates when compared to the dnER group. Similar 2-year outcomes were noted in aBP and dnER groups respectively including MALE (17% vs 12%, p=0.41, **Fig.1**), limb salvage (92.4% vs 90.7%, p=0.73) and survival (88.2% vs 81.3%, P=0.29). Seven patients underwent redo-bypass graft after failing EVT (aBP 5.6% vs dnER=5.3%, p=0.93), the rest had successful EVT (94.5%). Intraoperative parameters including procedural time (139 vs 119 min, P=0.14), contrast volume (99 vs 104.6 ml, P=0.79), and radiation dose (776.1 vs 662.7 mGy, P=0.53) were comparable between groups.

SCIENTIFIC SESSION ABSTRACTS continued

Conclusions: The safety and efficacy of EVT for CLTI patients with remotely occluded grafts are comparable to those without previous bypass. Although TLR and MALE were higher in patients with failed grafts, limb preservation was similar at long-term follow up. Intraoperative parameters suggest similar complexity in both groups. Vascular specialists should consider EVT as an alternative to reduce complex surgical re-interventions.

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J. Chung: Nothing to disclose, **H. Elizondo:** Nothing to disclose,
N. Hansraj: Nothing to disclose, **M. Shahbazi:** Nothing to disclose,
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B. Najafi: Nothing to disclose, **J. L. Mills:** Nothing to disclose,
M. Montero-Baker: Nothing to disclose

32. Early Real-World Comparison of Ellipsys Percutaneous Arteriovenous Fistulas to Surgically-Created Fistulas

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Objective: Despite promising initial results regarding the creation of percutaneous arteriovenous fistulas (pAVF), a paucity of data exists which provides direct comparison between percutaneously-created AVFs and open surgically-created AVFs (sAVF). This study seeks to compare clinical outcomes of pAVFs to sAVFs, with emphasis on clinical maturation and frequency of post-operative interventions.

Methods: Single-center retrospective review was performed on all consecutive patients undergoing surgically-created brachiocephalic arteriovenous fistula (BC-AVF, sAVF group) from during 2018 (Figure 1) and Ellipsys-created percutaneous arteriovenous (pAVF group) during 2019 (Figure 2). Comparative analysis between groups was performed.

Results: A total of 24 patients underwent pAVF creation and 62 patients underwent surgically-created BC-AVF (Table 1). Both the pAVF and sAVF groups had comparable mean operating times (60 ± 40 vs. 56 ± 25 min, $p = 0.67$) and rates of technical success (23 [96%] vs. 62 [100%], $p = 0.28$), respectively. The pAVF group had a lower clinical maturation rate (12 [52%] vs. 54 [87%], $p = 0.003$) and a higher primary failure rate (9 [39%] vs. 6 [10%], $p = 0.003$) when compared to the sAVF group. The pAVF group had an increased overall rate of undergoing a post-operative intervention (18 [78%] vs. 13 [21%], $p < 0.001$), as well as an increased number of total post-operative interventions (1.1 ± 0.9 vs. 0.3 ± 0.6 interventions, $p < 0.001$) compared to the sAVF group. Percutaneous transluminal angioplasty (PTA) of the juxta anastomotic segment was the most prevalent post-operative intervention performed in the pAVF group and occurred at a significantly increased frequency compared to the sAVF group rate (13 [57%] vs. 5 [8%], $p < 0.001$).

Conclusion: Patients undergoing Ellipsys-created pAVF had inferior rates of clinical maturation and underwent more post-operative interventions when compared to patients undergoing surgically-created BC-AVF in our single-center retrospective review. Outcome discrepancies compared to previously reported Ellipsys data demonstrate a need for further studies examining the real-world translatability of the pAVF device.

Figure 1. Surgical AVFs

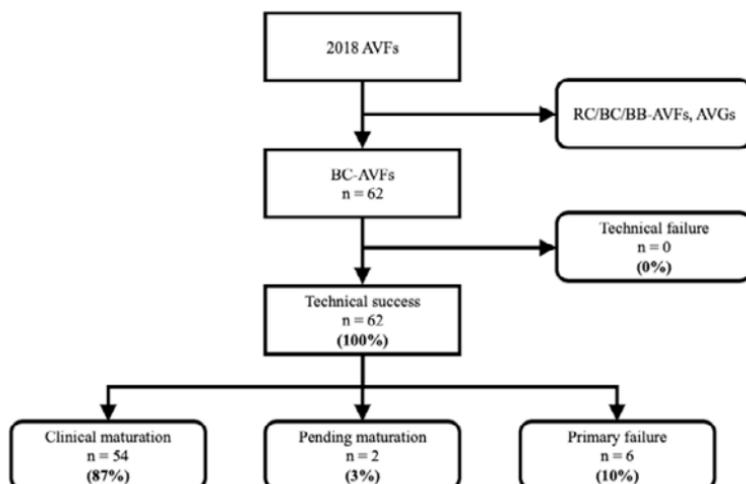
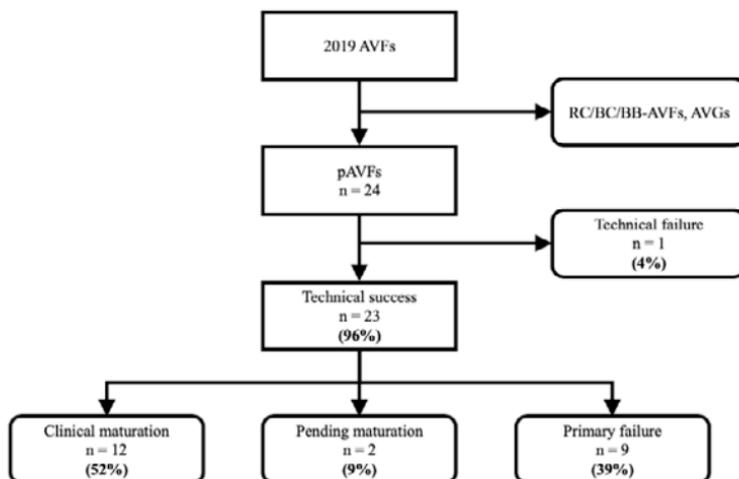


Figure 2. Percutaneous AVFs



SCIENTIFIC SESSION ABSTRACTS continued

Table 1. Comparison of pAVF and sAVF groups			
	<i>Group pAVF(n = 24)</i>	<i>Group sAVF(n = 62)</i>	p-value
Age, years	56.7 ± 22.6	62.5 ± 13.2	0.15
Preoperative hemodialysis	14 (58%)	41 (66%)	0.62
Operating time, minutes	60 ± 40	56 ± 25	0.67
Technical success	23 (96%)	62 (100%)	0.28
Clinical maturation	12 (52%)	54 (87%)	0.003 *
Post-operative intervention (Any)	18 (78%)	13 (21%)	< 0.001 *
Mean number of post-operative interventions	1.1 ± 0.9	0.3 ± 0.6	< 0.001 *
Complication (Any)	3 (13%)	7 (11%)	> 0.99
Duration of follow up, months	6.1 ± 4.0	2.7 ± 2.6	< 0.001 *
Categorical variable are presented as a number (n, %). Continuous variables are presented as a mean ± standard deviation or median (range).			

Author Disclosures: **R. B. Osofsky:** Nothing to disclose,
D. Byrd: Nothing to disclose, **J. Reagor:** Nothing to disclose,
J. Das Gupta: Nothing to disclose, **R. Clark:** Nothing to disclose,
J. Owen: Nothing to disclose, **J. Marek:** Nothing to disclose,
M. Langsfeld: Nothing to disclose, **L. A. Chavez:** Nothing to disclose

33. Treatment of Superficial Venous Reflux in CEAP 6 Patients: A Comparison of Cyanoacrylate Glue and Radiofrequency Ablation Techniques

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Objective: Venous leg ulcers (CEAP 6) represent the severest form of chronic venous insufficiency. As closure techniques for superficial venous reflux evolve, outcome comparisons of treatments are integral as studies demonstrate early endovenous intervention improves wound healing. This study aims to compare rates of venous wound healing between two techniques of superficial vein closure: ClosureFast radiofrequency ablation (RFA) and adhesive closure (VenaSeal).

Methods: A multi-institutional retrospective review of all healed CEAP 6 patients who underwent closure of their truncal veins from 2015-2020 was performed. Patients undergoing RFA were compared to those undergoing VenaSeal adhesive closure. Primary endpoint was time to wound healing. Secondary endpoints included ulcer recurrence and infection rates. Bivariate analysis involved Chi-square, Fisher's Exact, T and Wilcoxon rank sum tests. Multivariate linear regression analysis examined factors affecting time to wound healing in the most predictive model. Statistical significance was defined as p value <0.05.

Results: 119 CEAP 6 patients were included with median follow-up of 105 days [IQR: 44-218]. 68 limbs were treated with RFA and 51 limbs treated with VenaSeal. Significantly more patients undergoing RFA had a history of DVT (29% vs. 10%, p=0.01), deep venous reflux (82% vs. 51%, p<0.001), and perforator reflux (60% vs. 28% , p=0.003). The VenaSeal group was older (72 years vs. 65 years, p=0.02) with higher rate of CAD (37% vs 16%, p=0.01). Mean time to wound healing after procedure was significantly shorter for VenaSeal than RFA (72 vs. 294 days, p<0.001). [Table 1]. Two RFA patients had post-procedure infection. Ulcer recurrence rate was 19.3% (22.1% RFA vs 13.7% VenaSeal p=0.25). On multivariate analysis, treatment modality was the only significant predictor of time to wound healing. VenaSeal treated ulcers healed on average 2.5 mo faster than RFA (p=0.02) [Table 2]. Controlling for ulcer size categorized into three groups (<3cm², 3-11cm², and >11cm²), VenaSeal closure significantly healed wounds faster in ulcers >3cm². [Figure 1].

SCIENTIFIC SESSION ABSTRACTS continued

Conclusion: ClosureFast and VenaSeal are both safe and effective treatments to eliminate truncal venous insufficiency. VenaSeal has superior rates of wound healing compared to ClosureFast in ulcers >3cm².

Figure 1. Time to wound healing by ulcer size

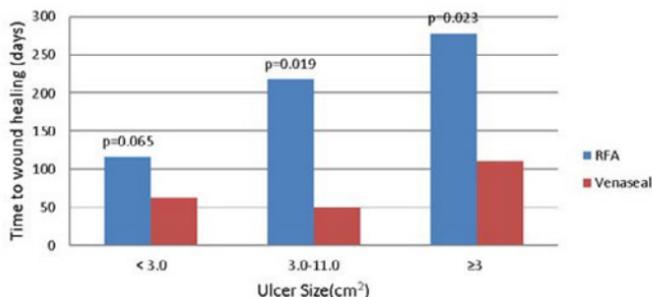


Table 1. Univariate Analysis Comparing RFA to VenaSeal

	RFA	VenaSeal	P value
Age	65 ± 15	72 ± 16	0.02
Male Gender	51%	49%	0.79
Body Mass Index (BMI)	35 ± 12	32 ± 8	0.41
History of DVT	29%	10%	0.009
History of CAD	16%	37%	0.01
Deep Venous Reflux	82%	51%	<0.001
Perforator Reflux	60%	28%	0.003
Duration of ulcer prior to treatment (months)	5.6 ± 11	4.7 ± 4	0.15
Time to wound healing (days)	294 ± 1037	72 ± 77	<0.001

Table 2. Multivariate Analysis of Predictors of Improved Time to Wound Healing

Variable	Estimate (Days)	t value	P value
VenaSeal (vs RFA)	-76	-2.48	0.02
Age	0.57	.99	0.56
History of DVT (vs no DVT)	64.3	1.77	0.08
History of CAD (vs no CAD)	-16.9	-0.05	0.62
Deep Venous Reflux (vs no DVR)	-29.2	-0.90	0.37

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34. Pedal Arterial Calcification Score Correlates with Risk of Major Amputation in Chronic Limb Threatening Ischemia

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Objective: The Ferraresi medial arterial calcification (F-MAC) score is a simple scoring system that describes the burden of inframalleolar calcification based on plain x-ray films of the foot. We hypothesize that higher F-MAC score is associated with increased risk of major amputation in patients with chronic limb threatening ischemia (CLTI).

Methods: This is a single-institution retrospective cohort study of 251 patients who underwent infrainguinal revascularization for CLTI between 4/2013 and 7/2019. Only the first revascularized limb was included in patients with bilateral CLTI. F-MAC scores were calculated by a single blinded reviewer using two-view plain foot radiographs. Each patient was assigned a score of 0-5 based on the presence of > 2 cm of calcification in the dorsalis pedis (0-1), plantar (0-1) and metatarsal (0-1) arteries, and > 1 cm of calcification in the hallux (0-1) and non-hallux digital arteries (0-1). Demographic, clinical presentation and outcomes data were collected from the electronic medical record.

Results: The distribution of F-MAC scores was 0 (112/251; 45%), 1 (12/251; 3.8%), 2 (21/251; 8.4%), 3 (44/251; 12%), 4 (31/251; 12%) and 5 (30/251; 12%). F-MAC scores were trichotomized to facilitate analysis [mild (0-1), moderate (2-4), severe (5)] and were found to correlate with male sex, diabetes mellitus, end-stage renal disease (ESRD) and hyperlipidemia. Our trichotomized F-MAC system did not associate with the Society for Vascular Surgery Wound, Ischemia and foot Infection (WIFI) grades, or overall WIFI stage ($p=0.38$). Median follow-up was 464 days (IQR: 172-896). Higher F-MAC score was significantly associated with risk of major amputation ($p<0.0001$; Figure 1). In a Cox Proportional Hazards multiple regression model for major amputation that included F-MAC score, diabetes, ESRD, procedural approach and WIFI stage, the most severe F-MAC score (HR 4.4 [1.8-10.4] for F-MAC 5, $p<0.001$) and WIFI stage (HR 2.3 [1.2-4.5] for WIFI 4, $p=0.02$) were significantly associated with major amputation (Figure 2).

Conclusions: The F-MAC score is a strong independent predictor of major amputation in CLTI. It is a simple clinical tool that may be used in conjunction with the current WIFI staging system to help stratify risk of limb loss and determine optimal treatment strategies for patients with CLTI.

Figure 1. F-MAC score predicts major amputation

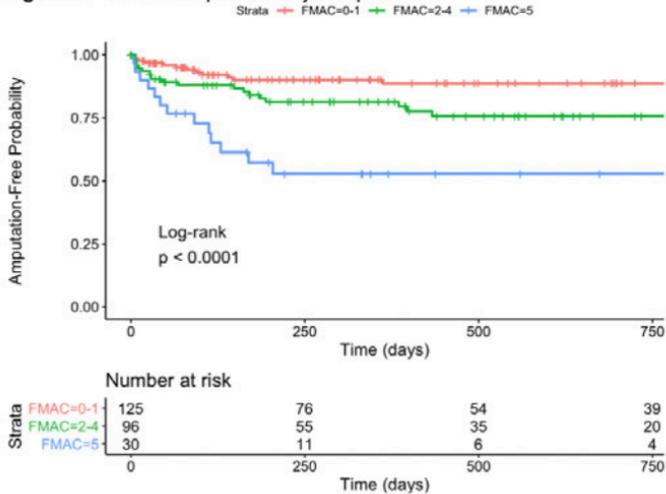
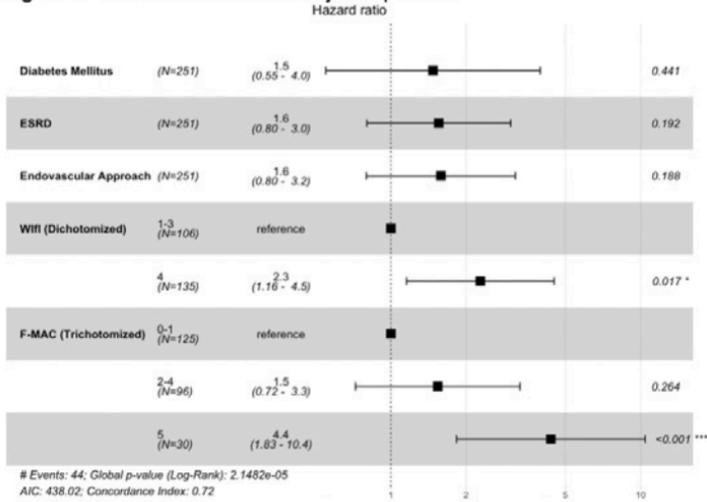


Figure 2. Multivariate model for major amputation



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 B. Wu: Nothing to disclose, V. Krepiy: Nothing to disclose,
 R. Ferraresi: Nothing to disclose, A. M. Reyzelman: Nothing to disclose,
 J. S. Hiramoto: Nothing to disclose, P. A. Schneider: Nothing to disclose,
 M. S. Conte: Nothing to disclose, S. M. Vartanian: Nothing to disclose

35. Influence of Thoracic Endovascular Aortic Repair on True Lumen Helical Morphology for Stanford Type B Dissections

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Objective: Thoracic endovascular aortic repair (TEVAR) can change the morphology of the flow lumen in aortic dissections, which may affect aortic hemodynamics and function. This study characterizes how helical morphology of the true lumen in Type B aortic dissections is altered by TEVAR.

Methods: Patients with type B dissection who underwent computed tomography angiography (CTA) pre- and post-TEVAR were retrospectively recruited. Images were used to construct 3D stereolithographic (STL) surface models of the true lumen and whole aorta using custom software (Fig 1). STL models were segmented and co-registered to determine helicity of the true lumen with respect to whole aorta. Helical angle, helical radius, helicity (change of helical angle over 3 cm using a sliding window), and cross-sectional eccentricity and area were quantified for the true lumen region covered by the endograft for pre- and post-TEVAR (Fig 1). Two-tailed paired t-tests were used to compare pre- and post-TEVAR metrics.

Results: Twelve patients (61.75 ± 7.74 years, 8.3% female) were treated successfully for complicated type B dissection with TEVAR (*C-TAG*, WL Gore & Associates). From pre- to post-TEVAR, true lumen helical angle (-63 ± 70 to $-58 \pm 72^\circ$, $p=0.732$) and peak helicity (-16 ± 15 to $-19 \pm 12^\circ/\text{cm}$, $p=0.237$) did not change significantly (Fig 2, Tab 1). Both true lumen average helical radius (1.37 ± 0.49 to 0.96 ± 0.55 cm, $p=0.001$) and eccentricity (0.84 ± 0.15 to 0.66 ± 0.15 , $p=0.002$) significantly decreased from pre- to post-TEVAR, whereas the average cross-sectional area increased significantly (3.22 ± 1.00 to 4.59 ± 1.58 cm², $p=0.014$).

Conclusions: The unchanged helical angle and peak helicity as a result of TEVAR suggest that the proximal and distal portions of the region of interest were constrained to angular positions and the endografts that were utilized to treat this cohort were helically conformable in the angular direction. The decrease of average helical radius indicated a straightening of the “corkscrew” shape of the true lumen, which may affect hemodynamics and aortic tissue stress. The impact of TEVAR on dissection flow lumen morphology and the interaction between endografts and aortic tissue will provide useful information for improving device design, implantation technique, and long-term clinical outcomes.

SCIENTIFIC SESSION ABSTRACTS continued

Table 1. Quantified metrics in the region of interest pre- and post-TEVAR.

	Pre-TEVAR	Post-TEVAR	P-value (bold if <0.05)
Helical angle [°]	-63±70	-58±72	0.732
Peak helicity [°/cm]	-16±15	-19±12	0.237
Average helical radius [cm]	1.37±0.49	0.96±0.55	0.001
Average true lumen eccentricity [-]	0.84±0.15	0.66±0.15	0.002
Average true lumen area [cm ²]	3.22±1.00	4.59±1.58	0.014

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G. Suh: Nothing to disclose, **M. D. Dake:** Nothing to disclose,

J. T. Lee: Nothing to disclose, **C. P. Cheng:** Gore: Consultant, Bentley: Consultant

36. Management Strategy for Lower Extremity Malperfusion Due to Acute Aortic Dissection

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Objective: Aortic dissection (AD) can be devastating resulting in visceral, spinal, and extremity ischemia. We describe the management and outcomes of patients presenting with AD and lower extremity malperfusion.

Methods: A single-center institutional aortic database was queried for patients with AD and lower extremity malperfusion (LEM) from 2011-2019. Primary endpoints were amputation and resolution of LEM following aortic repair. Secondary endpoints were in-hospital mortality, surgical management, time to intervention, and postoperative complications.

Results: Of 769 AD patients, 43 (5.6%) presented acutely with LEM: 17 type A AD (TAAD) and 26 type B AD (TBAD) (age 55 ± 13 years, 93% men). Most presented as Rutherford IIB, but TAAD more often had Rutherford III compared to TBAD. Aortic repair was performed prior to LEM operation in 37 (86%) patients (19 TEVAR, 18 open aortic repairs). LEM resolution was higher in those with primary AD repair compared to primary limb repair (78% vs. 33%, p=.04). Six (16%) required additional limb intervention after AD repair including extra-anatomic revascularization in 4 and iliac stenting in 2. Fasciotomies were performed in 19 (51%) and 1 patient required amputation (2%). Six patients had limb first intervention with extra-anatomic revascularization-- 3 had subsequent TEVAR, 1 had open aortic fenestration, and 2 had their AD medically managed. (**Figure**) Three patients (2 open TAAD repairs in the AD first group, and 1 endovascular TBAD who had limb first intervention), suffered lower extremity paralysis (7%), all attributed to spinal cord ischemia. TAAD more commonly presented emergently (100% vs. 73%, p=0.03), but concomitant visceral ischemia was more common in TBAD (0% vs. 38%, p=0.003). In-hospital mortality was 7% (3), with no difference between TAAD and TBAD. There was no difference in most postoperative complications. Median time to surgical intervention was 0.5 days (IQR: 0.3-2.4) and was longer in TBAD patients (0.4 [IQR: 0.2-0.4] vs. 1.4 [IQR: 0.5-3.2] days, p=0.03). (**Table**)

Conclusions: In patients presenting with acute AD with limb ischemia, resolution of the malperfusion occurs in the majority of cases after primary dissection intervention; emphasizing the utility of urgent TEVAR for type B and open repair of type A prior to lower extremity management.

SCIENTIFIC SESSION ABSTRACTS continued

Table: Perioperative variables and outcomes, *p<.05 considered significant

Variable	Total (n=43)	TAAD (n=17)	TBAD (n=26)	P-value
Global visceral ischemia	10 (23.3%)	0 (0%)	10 (38.5%)	.003*
Time to intervention (days)	0.53 (0.31-2.43)	0.35 (0.24-0.4)	1.4 (0.54-3.22)	.028*
Amputation	1 (2.3%)	1 (5.9%)	0 (0%)	.395
Respiratory complication	17 (39.5%)	11 (63.7%)	6 (23.1%)	.008*
Reintervention rate	20 (46.5%)	11 (64.7%)	9 (34.6%)	.056
Length of stay	13 (8-25)	20 (10-33)	12 (7-17)	.024*
In-hospital mortality	3 (7%)	1 (5.9%)	2 (7.7%)	.999

Author Disclosures: **A. Plotkin:** Nothing to disclose,

D. Vares-Lum: Nothing to disclose, **G. A. Magee:** Nothing to disclose,

S. M. Han: Nothing to disclose, **V. L. Rowe:** Nothing to disclose

37. Respiratory-induced Changes in Reno-visceral Branch Vessel Morphology Following Fenestrated Thoraco-abdominal Aneurysm Repair with a Flexible Balloon Expandable Covered Stent

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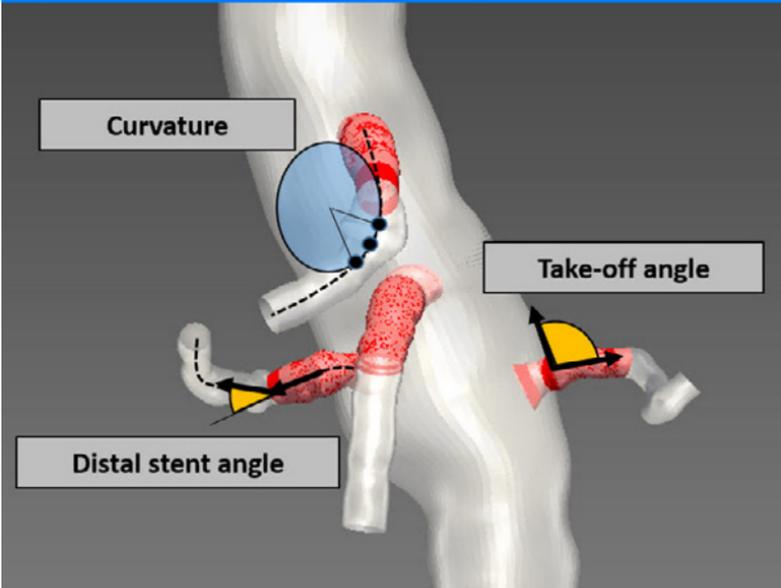
Objective: This study evaluates respiratory-induced changes in branch vessel geometry after thoraco-abdominal fenestrated endovascular aneurysm repair (fEVAR) with a flexible balloon expandable covered bridging stent (BECS).

Methods: Patients treated with fEVAR for thoraco-abdominal aortic aneurysms with a Cook ZFEN endograft and Bentley BeGraft stents were prospectively recruited. Using SimVascular software, pre- and post-operative aortic and branch contours were segmented from CT angiograms performed during inspiratory and expiratory breath-holds. Centerlines were extracted from lumen contours, from which branch take-off angles, distal-stent angles, and peak branch curvature changes were computed (**Figure 1**). Paired, two-tailed t-tests were performed to compare pre- and post-operative deformations.

Results: Reno-visceral vessel geometry was evaluated on 12 patients undergoing fEVAR with a total of 46 target vessels (10 celiac, 12 superior mesenteric (SM), 24 renal arteries). Implantation of bridging stents was associated with significant reduction in respiration-induced change in vessel branch angulation in the renal arteries ($\Delta 5.3 \pm 0.8^\circ$ vs. $\Delta 12.0 \pm 1.7^\circ$ [post- vs pre-op], $p = .001$), and trended toward reductions in the celiac ($\Delta 7.5 \pm 2.3^\circ$ vs. $\Delta 14.3 \pm 3.1^\circ$, $p = .10$) and SM ($\Delta 8.2 \pm 2.0^\circ$ vs. $\Delta 15.9 \pm 2.8^\circ$, $p = .07$) arteries. Peak vessel curvature change decreased following fEVAR in the SM ($\Delta 0.28$ vs $\Delta 0.47 \text{cm}^{-1}$, $p = .04$), but was unchanged in the celiac ($p = .61$) and renal ($p = .51$) arteries. The right renal artery exhibited increased respiratory-induced change in angulation at the distal-stent ($\Delta 7.7 \pm 2.3^\circ$ vs. $\Delta 1.5 \pm 2.3^\circ$, $p = .04$), with no change in the left renal ($p = 0.71$), celiac ($p = 0.34$) or SM ($p = 0.55$) arteries.

Conclusions: Implantation of a BECS in fEVAR is associated with decreased respiratory-induced deformation in renal branch take-off angulation, and reduced peak curvature bending in the SM artery. However, the flexibility of this BECS allowed celiac and renal artery bending similar to the native pre-operative state. Increased respiratory-induced angulation change at the distal stent/native artery transition in the right renal artery suggests a pivot point at the inferior vena cava. Further research is required to investigate the impact of these changes on long-term stent patency.

Figure 1: Branch vessel curvature and angulation calculation method



Author Disclosures: **K. Tran:** Nothing to disclose,
G. Y. Suh: Nothing to disclose, **S. Haulon:** Cook medical: Consultant,
Bentley: Consultant, **C. Cheng:** Gore: Consultant, Bentley: Consultant

MISSION, VISION, AND VALUES STATEMENTS

**Formulated by the Executive Council of 2020,
these statements reflect the efforts of member surgeons.**

MISSION

To promote education, research, advocacy and leadership in the art and science of compassionate vascular health in the Western United States, Canada and the Pacific Rim.

VISION

To inspire excellence and innovation in vascular surgery.

VALUES

1. Education

We strive to continue to produce a high quality, balanced scientific meeting to attract the best and brightest into our field, expanding incorporation of new science, techniques and practices

2. Research

We encourage multi-center collaboration on research initiatives in the Western United States, Canada and the Pacific Rim

3. Public Awareness

We endeavor to increase public awareness of the prevalence of vascular disease and promote optimizing vascular health through public outreach. Preserving and promoting the very rich academic heritage and tradition of the Western Vascular Society is of paramount importance.

4. Advocacy

We encourage professionalism, diversity and inclusiveness at the highest levels for ethical and compassionate care for patients.

5. Career Development

We promote leadership development to the WVS membership to cultivate future vascular surgery leaders locally, regionally, nationally, and internationally.



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 Mexico, Oklahoma,

CONSTITUTION & BYLAWS continued

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

Exception to this rule is in the case of any active duty military personnel who are welcome to membership regardless of their geographic location.

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 one (1) 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 publications, non-profit or federal grant support, invited lectures, professorships, faculty appointments, invited publications, participation in clinical trials, device development, active participation in local/ regional vascular societies or serving on hospital committees.

Contributions to Vascular Education – this can be reflected by teaching responsibilities at a vascular or general surgery training program, hospital grand rounds, seminars, proctorship of new vascular procedures or other lectureships.

5. Senior members shall consist of active members who have reached the age of sixty-five (65) or who for reasons of health or other just cause, the Council recommends for classification in this category. Senior members shall not be bound by requirements for attendance at meetings; however, working senior members shall continue to pay annual dues until such time as they have notified the Secretary-Treasurer that they have left active practice.

CONSTITUTION & BYLAWS continued

6. Honorary members of the Society shall consist of individuals who have made outstanding contributions in the field of vascular science. Honorary members shall not be bound by the requirements for attendance at meetings, shall have no voting privileges nor shall they 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-M.D.s 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. Adjunct members shall not have voting privileges, be able to hold office, participate on standing committees, or 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.

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 for membership shall be available only by request of a sponsoring member and shall be provided by the Secretary-Treasurer.

b. 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 two (2) 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 other members are desirable.

CONSTITUTION & BYLAWS continued

c. The Secretary-Treasurer shall send to the Chairman of the Membership Committee these applications with all pertinent data, including supporting letters, at least two (2) months before the annual meeting. The Membership Committee shall review the professional qualifications of the candidates.

d. The list of candidates with data concerning them shall be circulated by the Secretary-Treasurer to all members of the Society at least one (1) month before the annual meeting.

e. 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.

f. 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.

g. 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.

h. A candidate who fails election at one meeting may be presented for re-consideration of membership at a subsequent meeting by repeating the above process.

2. Honorary members:

a. Any active or senior member may nominate an individual for membership. The name and brief description of the accomplishments of the nominee must be submitted to the Secretary-Treasurer at least six (6) months prior to the annual meeting for circulation to an Honorary Membership Committee, which consists of the three (3) past presidents on the Council.

b. The Honorary Membership Committee shall make its recommendations to the Council.

c. Following its deliberation, the Council may recommend that the candidate's name be submitted by the Secretary-Treasurer to the membership in the annual report presented at the Executive Session of the Society.

CONSTITUTION & BYLAWS continued

- 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 a transfer he/she 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.
6. The annual meeting of the Council shall precede the Executive Session of the Society membership.

CONSTITUTION & BYLAWS continued

7. A majority of the voting members of the Council shall constitute a quorum for the transaction of business. Voting can take place electronically via email or poll.
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. Secretary-Treasurer and Recorder both serve three (3) year terms. The President may not serve more than one (1) term.
3. Officers of the Society shall be nominated by the Nominating Committee that shall present the slate to the membership at the Executive Session of the annual meeting. Additional nominations may be made from the floor of the Executive Session each year. The election shall take place at the Executive Session and election shall be by a majority of the votes cast.
4. The President shall preside at meetings of the Society and the Council, preserve order, regulate debates, announce results of elections, appoint committees not otherwise provided for, sign Certificates of Membership, and perform the duties of the President's office.
5. The President-Elect, in the absence or incapacity of the President, shall perform the duties of the President's office.

CONSTITUTION & BYLAWS continued

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 ensure proper storage of the minutes of the meetings of the Society and Council, attest all official acts requiring certification; notify officers and members of their election; 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 ensure issue to all members of the Society a program of the forthcoming meeting. He/she 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/she shall ensure receipt of all moneys and funds belonging to the Society; ensure payment of all bills; ensure rendering of 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 five-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 society headquarters and at the UCLA Medical Center by the archivist of the Louise Darling Library.

9. The Recorder shall ensure receipt of all papers and reports of discussions on papers presented before the Society. The Recorder, together with the Program Committee, shall ensure submission of manuscripts to the Journal of Vascular Surgery for publication.

ARTICLE VII – COMMITTEES

1. Standing committees of the Society shall consist of a Membership Committee, a Nominating Committee, a Program Committee, and a Local Arrangements Committee for the annual meeting.
2. The Membership Committee shall consist of three (3) members who shall be appointed by the President to serve overlapping terms of three (3) years each. The Secretary-Treasurer shall be an ex officio member of the membership committee. The senior member in service on this Committee shall be the Chairman. Nominations to the Membership Committee shall be made by the Nominating Committee which shall present the slate to the membership at its annual business meeting. Election shall be by a majority of votes cast at the Executive Session. 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. The President, 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 ensure 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.

CONSTITUTION & BYLAWS continued

6. The Council may from time to time establish such other Committees as it deems advisable. Each such Committee shall consist of such persons and shall have such duties and the Council upon establishment of the Committee from time to time may designate powers as 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 will 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. Voting can be done via electronic means.

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 original 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.

CONSTITUTION & BYLAWS continued

8. Special meetings of the Society may be called at any time by the President. The President must call a special meeting whenever he is requested to do so in writing by ten (10) members of the Society in good standing.

9. Notice of any Executive Session of any annual or special meeting of the Society shall be given to each member of the Society not less than thirty (30) nor more than forty (40) days prior to the Executive Session by written or printed notice delivered personally or by mail, by or at the direction of the Council, the President or the Secretary -Treasurer. Such notice shall state the place, day and hour of the Executive Session and in the case of a special meeting shall also state the purpose or purposes for which the Executive Session is called.

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

CONSTITUTION & BYLAWS continued

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.

11. The societies current President and Recorder will moderate the first Scientific Session of the Annual Meeting. The incoming President-Elect and current Recorder will moderate the final Scientific Session of the Annual Meeting. All other moderators for all other sessions will consist of and be chosen by the Program Committee.

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 or email invitation and active registration for the annual meeting.

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 email and 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 Council shall establish the rules governing disciplinary proceedings based upon such charges from time to time.

ARTICLE XII – PAPERS AND REPORTS

1. All papers and reports read before the Society shall be submitted to the Journal of Vascular Surgery prior to the time of their presentation at the Annual Meeting. The Recorder shall be responsible for ensuring the submission of these manuscripts.
2. No paper shall be submitted for publication as having been read before the Society unless it has been read before the Society. Remove this section.
3. Final submission of a manuscript to the JVS must be done within 2 months of the presentation at the annual meeting. The exception would be if the revisions suggested at the meeting required more time, in which case the request can be made for an extension. The penalty for no or late submission is ineligible abstract submission to the WVS for 1 year.

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.

CONSTITUTION & BYLAWS continued

ARTICLE XV – SEAL

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

ARTICLE XVI – NOTICE AND WAIVER OF NOTICE

1. Whenever, under applicable law, these Bylaws, or resolution of the Council, notice is required to be given to any member, Council member or Officer, such notice may be given in writing, by e-mail or standard mail, addressed to such member, Council member or Officer, at his or her address/electronic 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 attend 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,

CONSTITUTION & BYLAWS continued

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

ARTICLE XVIII – AMENDMENT

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

ARTICLE XIX – RULES AND REGULATIONS

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

Amended September 2019

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CONTACT INFORMATION



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