



AMERICAN VENOUS FORUM 24TH ANNUAL MEETING

February 8–11, 2012

Loews Royal Pacific | Orlando, Florida

EXECUTIVE COMMITTEE

<i>President</i>	Seshadri Raju, MD (2012) Flowood, Mississippi
<i>President-Elect</i>	Robert B. McLafferty, MD (2012) Springfield, Illinois
<i>Secretary</i>	Fedor Lurie, MD (2013) Honolulu, Hawaii
<i>Treasurer</i>	John Blebea, MD (2014) Tulsa, Oklahoma
<i>Recorder</i>	Peter K. Henke, MD (2012) Ann Arbor, Michigan
<i>Archivist</i>	William A. Marston, MD (2014) Chapel Hill, North Carolina
<i>Past-Presidents</i>	Joann Lohr, MD (2012) Cincinnati, Ohio Joseph A. Caprini, MD (2013) Skokie, Illinois Peter J. Pappas, MD (2014) Brooklyn, New York
<i>Councilors</i>	Joseph D. Raffetto (2012) West Roxbury, Massachusetts Elna Masuda, MD (2013) Honolulu, Hawaii Julianne Stoughton, MD (2014) Stoneham, Massachusetts

COMMITTEES 2011–2012

BYLAWS COMMITTEE

Fedor Lurie, MD (2013), *Chair*
Daniel Monahan, MD (2012)
Mark Iafrati, MD (2013)

FELLOWS EDUCATION COMMITTEE

Steven Elias, MD (2013), *Chair*
Manju Kalra, MD (2013)
William A. Marston, MD (2013)
Linda Harris, MD (2013)
Thomas O'Donnell, MD (2013)
Mark Meissner, MD (2013)
Antonios Gasparis, MD (2013)
Daniel Clair, DVM (2013)
Joann Lohr, MD (2012), *Ex-Officio*
Lowell Kabnick, MD (2012), *Ex-Officio*

GRANTS & AWARDS COMMITTEE

Nicos Labropoulos, PhD (2012)
Peter J. Pappas, MD (2014), *Ex-Officio*
David Gillespie, MD (2014), *Ex-Officio*

GUIDELINES COMMITTEE

Peter Gloviczki, MD (2012), *Co-Chair*
Mark Meissner, MD (2012), *Co-Chair*
Bo Eklof, MD (2012)
David Gillespie, MD (2012)
Joann Lohr, MD (2012)
Robert McLafferty, MD (2012)
Frank Padberg, MD (2012)
Peter J. Pappas, MD (2012)
Joseph Raffetto, MD (2012)
Thomas Wakefield, MD (2012)
Peter J. Pappas, MD (2014), *Ex-Officio*
David Gillespie, MD (2014), *Ex-Officio*

ISSUES COMMITTEE

Ashraf Mansour, MD (2012), *Chair*
John Blebea, M. D. (2013)
Fedor Lurie, MD (2013), *Ex-Officio*

MEMBERSHIP COMMITTEE

Jose Almeida, MD (2014), *Chair*
Anil Hingorani, MD (2012)
Ruth Bush, MD (2013)
Mark Garcia, MD (2013)
Lisa Pavone, MD (2014)
Fedor Lurie, MD (2013), *Ex-Officio*

NOMINATING & HONORARY MEMBERSHIP COMMITTEE

Joann Lohr, MD (2012), *Chair*
Joseph Caprini, MD (2013)
Peter J. Pappas, MD (2014)
Fedor Lurie, MD (2013), *Ex-Officio*

PATIENT EDUCATION COMMITTEE

Linda Harris, MD (2012), *Chair*
Gary Lemmon, MD (2012)
Paul Gagne, MD (2012)
Steve Zimmet, MD (2012)
Joann Lohr, MD (2012), *Ex-Officio*
Lowell Kabnick, MD (2012), *Ex-Officio*

PHYSICIAN/ALLIED HEALTH EDUCATION COMMITTEE

Jose Almeida, MD (2012), *Chair*
Timothy Liem, MD (2012)
Antonios Gasparis, MD (2012)
Julianne Stoughton, MD (2012)
Ashraf Mansour, MD (2012)
Ronald Bush, MD (2012)
Joann Lohr, MD (2012), *Ex-Officio*
Lowell Kabnick, MD (2012), *Ex-Officio*

PROGRAM COMMITTEE

Nicos Labropoulos, PhD (2014), *Chair*
Antonios Gasparis, MD (2013)
Harold Welch, MD (2014)
Byung-Boong Lee, MD (2014)
Fedor Lurie, MD (2013), *Ex-Officio*
Peter Henke, MD (2012), *Ex-Officio*

COMMITTEES 2011–2012

COMMITTEES

REGISTRY STEERING COMMITTEE

Brajesh Lal, MD, *Chair*
Joseph Raffetto, MD
Robert McLafferty, MD
John Rectenwald, MD
Jose Almeida, MD
David Gillespie, MD
Uchenna Onyeachom, MS, *Ex-Officio*

SCREENING COMMITTEE

Marc Passman, MD (2012), *Chair*
Todd Bohannon, MD (2012)
Joseph Schneider, MD (2012)
Colleen Johnson-Moore, MD (2012)
Rabih Chaer, MD (2013)
Apostolos Tassiopoulos, MD (2013)
Joann Lohr, MD (2012), *Ex-Officio*
Lowell Kabnick, MD (2012), *Ex-Officio*

RESEARCH COMMITTEE

Joseph Raffetto, MD (2012), *Chair*
Daniel Myers, MD (2012)
Gregory Landry, MD (2012)
Teresa Carman, MD (2012)
Peter J. Pappas, MD (2014), *Ex-Officio*
David Gillespie, MD (2014), *Ex-Officio*

WEBSITE COMMITTEE

Marc Passman, MD (2012), *Chair*
Antonios Gasparis, MD (2012)
Alessandra Puggioni, MD (2012)
Monika Gloviczki, MD (2012)
Joann Lohr, MD (2012), *Ex-Officio*
Lowell Kabnick, MD (2012), *Ex-Officio*

FUTURE MEETINGS

2013
February 27–March 2
The Wigwam
Phoenix, Arizona

AMERICAN VENOUS FORUM FOUNDATION

The American Venous Forum Foundation was organized in 1988 to support the charitable, educational and scientific purposes of the American Venous Forum. The Foundation provides the **BSN Jobst Fellowship Award**, **Servier Fellowship Award** and other significant educational grants to stimulate and recognize excellence in published writing on laboratory and clinical research in the study of venous diseases.

AMERICAN VENOUS FORUM FOUNDING MEMBERS

Robert W. Barnes, MD
John J. Bergan, MD
John J. Cranley, MD
W. Andrew Dale, MD
Ralph G. DePalma, MD
James A. DeWeese, MD
Lazar J. Greenfield, MD
Robert W. Hobson, II, MD
Michael Hume, MD
George Johnson, Jr., MD

Robert L. Kistner, MD
John M. Porter, MD
Seshadri Raju, MD
Norman M. Rich, MD
Charles G. Rob, MD
Joseph G. Sladen, MD
D. Eugene Strandness, Jr., MD
David S. Sumner, MD
J. Leonel Villavicencio, MD
James S. T. Yao, MD

AVF FOUNDATION BOARD OF DIRECTORS

<i>President</i>	Joann Lohr, MD Cincinnati, Ohio
<i>Secretary</i>	Fedor Lurie, MD Honolulu, Hawaii
<i>Treasurer</i>	John Blebea, MD Tulsa, Oklahoma
<i>Directors</i>	Joseph Caprini, MD Skokie, Illinois Lowell Kabnick, MD New York, New York Jose Almeida, MD Miami, Florida Elna Masuda, MD Honolulu, Hawaii Peter J. Pappas, MD Brooklyn, New York

DIRECTORS

**THE AMERICAN VENOUS FORUM
WAS ORGANIZED IN COOPERATION
WITH MEMBERS OF:**

Society for Vascular Surgery
American Association for Vascular Surgery
Canadian Society for Vascular Surgery

WITH THE SUPPORT OF MEMBERS OF:

International Union of Phlebology
North American Society of Phlebology
Phlebology Society of America
Austrian Society for Angiology
Benelux Society of Phlebology (Belgium, Netherlands and Luxembourg)
European Chapter of the International Society for Cardiovascular Surgery
German Society of Phlebology and Proctology
Latin American Chapter of the International Society for
Cardiovascular Surgery
Swiss Society for Phlebology
Sociedad Mexicana de Angiologia
College Francais de Pathologie
Société Francaise de Phlebologie
Société Francaise d'Angéiologie
Societa Italiana de Patologia Vascolare
Pan American Society of Phlebology and Lymphology
Sociedad Argentina de Flebologia y Linfologia
Australian and New Zealand Society of Phlebology

ANNUAL MEETINGS/PAST PRESIDENTS

1989	Feb. 22–24	John J. Bergan, MD <i>New Orleans, LA—Fairmont Hotel</i>
1990	Feb. 21–23	Norman M. Rich, MD <i>Coronado, CA—Hotel Del Coronado</i>
1991	Feb. 20–22	Lazar J. Greenfield, MD <i>Ft. Lauderdale, FL—Marina Marriott Hotel</i>
1992	Feb. 26–28	Michael Hume, MD <i>Coronado, CA—Hotel Del Coronado</i>
1993	Feb. 24–26	George Johnson, Jr., MD <i>Orlando, FL—Hilton Walt Disney World Village</i>
1994	Feb. 23–25	James A. DeWeese, MD <i>Maui, HI—Maui Inter-Continental Resort</i>
1995	Feb. 23–25	Robert Hobson, MD <i>Fort Lauderdale, FL—Marriott Harbor Beach</i>
1996	Feb. 22–24	Robert L. Kistner, MD <i>San Diego, CA—Hyatt Regency Hotel</i>
1997	Feb. 20–23	James S. T. Yao, MD <i>San Antonio, TX—Hyatt Regency Hill Country Resort</i>
1998	Feb. 19–21	D. Eugene Strandness, Jr., MD <i>Lake Buena Vista, FL—Walt Disney World Swan Hotel</i>
1999	Feb. 18–21	Thomas F. O'Donnell, Jr., MD <i>Dana Point, CA—Laguna Cliffs Marriott Resort</i>
2000	Feb. 3–6	David S. Sumner, MD <i>Phoenix, AZ—Hilton South Mountain Resort</i>
2001	Feb. 22–25	Anthony J. Comerota, MD <i>Ft. Myers, FL—Sanibel Harbor Resort</i>
2002	Feb. 21–24	Gregory L. Moneta, MD <i>La Jolla, CA—Hilton Torrey Pines La Jolla</i>
2003	Feb. 20–23	Peter Gloviczki, MD <i>Cancun, Mexico—Hilton Cancun Beach Resort</i>
2004	Feb. 26–29	Frank T. Padberg, MD <i>Orlando, FL—Gaylord Palms Resort</i>

ANNUAL MEETINGS

2005	Feb. 9–13	Bo G. Eklöf, MD <i>San Diego, CA—Loews Coronado Bay Resort</i>
2006	Feb. 22–26	Thomas W. Wakefield, M.D <i>Miami, FL—InterContinental Hotel</i>
2007	Feb. 14–17	Michael C. Dalsing, MD <i>San Diego, CA—Rancho Bernardo Inn</i>
2008	Feb. 20–23	Mark H. Meissner, MD <i>Charleston, SC—Charleston Place</i>
2009	Feb. 11–14	Joann Lohr, MD <i>Phoenix, AZ—Arizona Grand Resort</i>
2010	Feb. 10–13	Joseph A. Caprini, MD <i>Amelia Island, FL—Ritz-Carlton</i>
2011	Feb. 23–26	Peter J. Pappas, MD <i>San Diego, CA—Hilton San Diego Bayfront</i>

D. EUGENE STRANDNESS JR., MD MEMORIAL LECTURE

On January 7, 2002, the American Venous Forum was saddened by the passing of one of its founding members and past presidents, Dr. D. Eugene Strandness Jr. Dr. Strandness was a friend, mentor, colleague and leader in all aspects of vascular surgery. He held several NIH grants and wrote numerous publications on the etiology and non-invasive diagnosis of deep vein thrombosis. One of his most notable accomplishments was the development of duplex ultrasound scanning. His tireless pursuit of knowledge led to a better understanding of the natural history of venous disease and its diagnosis and treatment, for which our patients and we are forever indebted to him.

Each year, the D. Eugene Strandness Jr., MD Memorial Lecture recognizes the significant contributions of an individual in research, education or clinical investigation in the field of venous diseases. The recipient of this distinction, chosen by the president of the American Venous Forum and confirmed by the Forum's Executive Committee, has previously been named to the position of Presidential Guest Lecturer. In honor of the memory of Dr. Strandness, the lectureship was renamed in 2003 and is now known as the "D. Eugene Strandness Jr., MD Memorial Lecture."

This honor, the highest given by the organization, has been bestowed to the following outstanding candidates in past years:

- 2011** **David C. Zawieja, PhD, College State, Texas**
Microcirculatory and Lymphatic Disorders
- 2010** **Manuel Monreal Bosch, MD, Madrid, Spain**
RIETE Database and Multiple Clinical Perspectives
- 2009** **O. William Brown, MD, Bingham Farms, Michigan**
Venous Disease and Medical Malpractice: A Peek Inside the Playbook of a Plaintiff's Attorney
- 2008** **Thomas O'Donnell, Jr., MD, Boston, Massachusetts**
What's the Evidence for Treating Perforators in Venous Ulcers
- 2007** **Robert L. Kistner, MD, Honolulu, Hawaii**
Foresight 2020: Creating the Venous Vision
- 2006** **Pan Ganguly, PhD, Bethesda, Maryland**
The Challenges in Venous Thrombosis

- 2005 **Michel R. Perrin, MD, Chassieu, France**
The Importance of International Collaboration for the Development of a Scientific Approach to Venous Disease
- 2004 **Professor Eberhard Rabe, MD, Bonn, Germany**
Prevalence and Risk Factors of Chronic Venous Diseases: The Bonn Vein Study
- 2003 **Professor Claudio Allegra, MD, Rome, Italy**
Involvement of the Microcirculation in Chronic Venous Insufficiency
- 2002 **Professor Alfred Bollinger, MD, Zurich, Switzerland**
Microcirculation in Chronic Venous Insufficiency and Lymphedema
- 2001 **Professor C. V. Ruckley, MD, Edinburgh, Scotland**
Chronic Venous Insufficiency: Lessons from Scotland
- 2000 **Professor Sir Norman Browse, MD, FRCS, FRCP, Channel Islands, England**
Forty Years On
- David Robinson, PhD, Bethesda, Maryland**
A Journey to Complexity: The Continuing Evolution in Vascular Research
- 1998 **David Bergquist, MD, PhD, Uppsala, Sweden**
Chronic Leg Ulcer—The Impact of Venous Disease
- 1997 **Professor Kevin G. Burnand, London, United Kingdom**
Venous Thrombosis and Natural Thrombolysis
- 1996 **Ermenegildo A. Enrici, MD, Buenos Aires, Argentina**
The Role of the Perforants' System in Deep Venous Chronic Insufficiency in its Different Stages: Surgical Indications, Tactics and Techniques
- 1995 **Philip D. Coleridge Smith, MD, FRCS, London, United Kingdom**
Venous Disease and Leukocyte Mediated Microcirculatory Injury

- 1994 **Andrew W. Nicolaides, MD, FRCS, London, United Kingdom**
Deep Vein Thrombosis—Aetiology and Prevention: The Legacies of the 70's, the Promises of the 80's and the Challenges of the 90's
- 1993 **Olav Thulesius, MD, PhD, Linköping, Sweden**
Vein Wall Characteristics and Valvular Functions in Chronic Venous Insufficiency
- 1992 **G. W. Schmid-Schonbein, MD, La Jolla, California**
Leukocytes as Mediators of Tissue Injury
- 1991 **Jack Hirsh, MD, Hamilton, Ontario, Canada**
Development of Low Molecular Weight Heparin for Clinical Use
- 1990 **Hugo Partsch, MD, Vienna, Austria**
Diagnosis of AV Fistulas in Vascular Malformations

MEMORIAL LECTURE

2012
D. EUGENE STRANDNESS, JR., MD
MEMORIAL LECTURE

Venous and Arterial Thrombosis: Is There a Link?

Paolo Prandoni, MD, PhD
Chair, Internal Medicine
Department of Cardiothoracic and Vascular Sciences,
University of Padova, Padova, Italy



Professor Prandoni's interests are epidemiology, diagnosis and management of venous thromboembolism. Of particular interest are studies addressing the association of cancer with venous thromboembolism. Professor Prandoni has published more than 300 papers in peer-review journals. His main achievements have been:

- 1) The demonstration of the value of real-time compression ultrasonography for the diagnosis of DVT (NEJM 1989)
- 2) The confirmation of the risk for subsequent overt cancer in patients with idiopathic VTE (NEJM 1992)
- 3) The demonstration that LMWHs are as effective and safe as UFH in the treatment of DVT (Lancet 1992)
- 4) The demonstration that LMWHs allow the home treatment of DVT (NEJM 1996)
- 5) The description of the natural history of DVT, outlining the particularly high risk of recurrent thromboembolism in cancer patients (Ann Intern Med 1996)
- 6) The demonstration that both factor V Leiden and G20210A prothrombin variant are independent risk factors for recurrent VTE (NEJM 1997, Blood 2000)
- 7) The demonstration that residual vein thrombosis is a predictive marker of recurrent thromboembolism (Ann Intern Med 2002)
- 8) The demonstration that cancer patients with venous thrombosis have a high risk of recurrent thromboembolism while on anticoagulation (Blood 2003)

- 9) The demonstration of an association between atherosclerosis and venous thrombosis (NEJM 2003)
- 10) The demonstration that chronic pulmonary thromboembolic hypertension following an episode of pulmonary embolism is more frequent than commonly thought (NEJM 2004)
- 11) The demonstration that tailoring the duration of anticoagulation according to the persistence of residual vein thrombi reduces the risk of recurrent Thromboembolism (Ann Intern Med 2009)
- 12) The demonstration that fondaparinux is effective and safe for the treatment of superficial vein thrombosis in the legs (N Engl J Med 2010)

MEMORIAL LECTURE

**This lecture will be presented on Saturday,
February 11, 2012 at 10:40 am.
Please plan to attend this featured presentation.**

BSN-JOBST RESEARCH FELLOWSHIP IN VENOUS AND LYMPHATIC DISEASE

In 1995, the American Venous Forum Foundation announced the establishment of the Jobst Research Fellowship In Venous and Lymphatic Disease.

The Jobst Research Fellowship provides a one-year, \$50,000 grant to a research fellow chosen through a competitive peer-review selection process. A committee of distinguished vascular physicians, appointed by the American Venous Forum Foundation, determines the fellowship recipient and announces its selection during the opening session of the Annual Meeting.

1995	Peter J. Pappas, MD , UMDNJ New Jersey Medical School
1996	Jae-Sung Cho, MD , Mayo Clinic, Rochester, MN
1997	Andrew C. Stanley, MD , Burlington, VT
1998	Klaus See-Tho, MD , Stanford University Medical Center
1999	Joseph D. Raffetto, MD , Boston Medical Center
2000	No Award Given
2001	Brajesh K. Lal, MD , UMDNJ New Jersey Medical School
2002	Susan O'Shea, MD , Duke University Medical Center
2003	Charles Fields, MD , Mayo Clinic
2004	John Rectenwald, MD , University of Michigan
2005	Allesandra Puggioni, MD , Mayo Clinic
2006	Stephanie K. Beidler, MD , University of North Carolina
2007	Danny Vo, MD , Mayo Clinic
2008	K. Barry Deatruck, MD , University of Michigan
2009	Carolyn Glass, MD , University of Rochester
2010	Yanjie Qi, MD , University of Rochester
2011	Marlene Mathews, MD , University of Rochester

SERVIER TRAVELING FELLOWSHIP

The Servier Traveling Fellowship provides two fellows an opportunity to travel to the European Venous Forum to present his or her scientific research. Four (4) finalists are identified through a competitive peer-review process, and are invited to present their science during the AVF Meeting. Travel and accommodations for the four finalists are reimbursed as part of the grant. The finalists are judged by an appointed AVF committee. Two winners will be selected to present their work at the European Venous Forum.

- 2006 **Charles Stonerock, MD**, Indiana University School of Medicine
Gustavo Oderich, MD, Mayo Clinic
- 2007 **Brian Knipp, MD**, University of Michigan
Reagan Quan, MD, Walter Reed Army Medical Center
- 2008 **David Paolini, MD**, Toledo Hospital
Jorge Martinez, MD, Toledo Hospital
- 2009 **Atul Rao, MD**, University of Pittsburgh Medical Center
Axel Thors, MD, Good Samaritan Hospital
- 2010 **K. Barry Deatruck, MD**, University of Michigan
Christopher Pannucci, MD, University of Michigan
- 2011 **Faisal Aziz, MD**, Jobst Vascular Center
Robert Meisner, MD, Stony Brook University Hospital

BEST POSTERS

Each year, a formal poster session is held where authors are invited to give a 3-minute synopsis of their work followed by a 2-minute Q & A with the audience in attendance. Posters are scored and prizes are awarded to the top presentations.

2011 WINNERS

Jose Diaz

Neutralizing Interleukin-6 Reduces Vein Wall Fibrosis in a Deep Vein Thrombosis Mouse Model

Joseph Baldwin

The Role of Urokinase Plasminogen Activator and Plasmin Activator Inhibitor-1 On Vein Wall Remodeling In Experimental Deep Vein Thrombosis

Frank Vandy

Postoperative Complications of Trans-Illuminated Powered Phlebectomy: A Review of 188 Surgeries

AWARDS

GENERAL INFORMATION

REGISTRATION DESK

The Registration Desk will be located in the **Registration North** and will be open during the following hours:

Tuesday, February 7	4:00 pm – 6:00 pm
Wednesday, February 8	7:00 am – 5:00 pm
Thursday, February 9	7:00 am – 5:00pm
Friday, February 10	7:00 am – 1:00 pm
Saturday, February 11	7:00 am – 300 pm

REGISTRATION INFORMATION

Full Registration Fee Includes: The full registration fee includes all scientific sessions, continental breakfast, coffee breaks and boxed lunches. In addition, the registration fee includes entrance to the Exhibit Hall, the Welcome Reception on Wednesday and the Forum Finale on Saturday evening.

Full registration also includes the special symposia on Friday. However, pre-registration & tickets are required.

Spouse/Guest Registration Fee Includes: The spouse/guest (non-MD) registration fee includes the Welcome Reception, continental breakfast, mid-morning refreshments daily in the Hospitality Suite and Forum Finale on Saturday evening.

ANNUAL BUSINESS MEETING LUNCH (Members Only)

The Annual Business Meeting will be held on Friday, February 10, 2012 at 11:30 am in **Philippine Sea**.

INSTRUCTIONS TO AUTHORS

AUDIO/VISUAL

All presentations must be formatted using PowerPoint. All presenters must bring their PowerPoint presentations on a USB flash drive to the Speaker Ready Room at least two hours prior to their scheduled presentation. **Please Note:** Personal laptops will not be permitted at the podium.

MANUSCRIPTS

The American Venous Forum requires presenting authors of oral presentations to submit the full manuscript for journal publication. The Journal of Vascular Surgery is the official journal of the American Venous Forum, although authors may petition the AVF Recorder in writing to submit their manuscript to an alternate Index-Medicus, peer-reviewed journal. Presenters who fail to submit a manuscript to a recognized journal shall forfeit their right to present any material at two (2) consecutive future meetings of the American Venous Forum.

SCHEDULE-AT-A-GLANCE

24th Annual Meeting
February 8–11, 2012
Loews Royal Pacific | Orlando, FL

Wednesday, February 8, 2012

7:00 am – 8:00 am	Continental Breakfast
8:00 am – 12:00 pm	DAVID S. SUMNER VENOUS SUMMIT True Controversies in Venous Disease <i>Introduction: Seshadri Raju, MD, President</i> <i>Robert McLafferty, MD, President-Elect</i>
12:00 pm – 1:15 pm	Lunch on Own
1:30 pm – 3:10 pm	SCIENTIFIC SESSION 1 Superficial Vein Disease/Sclerotherapy <i>Moderators: Lowell Kabnick, MD</i> <i>Fedor Lurie, MD</i> <i>Jose Almeida, MD</i>
1:30 pm – 1:45 pm	1 Factors Associated with Recurrence of Varicose Veins After Thermal Ablation: 3-Year Results of the REVATA (Recurrent Veins After Thermal Ablation) Study R. G. Bush ¹ , P. Bush ¹ , J. Flanagan ² , R. Fritz ³ , T. Gueldner ⁴ , J. Koziarski ⁵ , K. McMullen ⁶ , G. Zumbro ⁷ <i>¹Midwest Vein & Laser Center, Centerville, OH,</i> <i>²Delaware Valley Vein Center, Phoenixville, PA,</i> <i>³Advanced Vein Center of North Texas, Irving, TX,</i> <i>⁴Wisconsin Vein Center, Manitowoc, WI,</i> <i>⁵Family Surgical, Battlecreek, MI, ⁶Varicose Vein Clinics of Oklahoma, Oklahoma City, OK, ⁷Vein Specialists of Augusta, Martinez, GA</i>

- 1:45 pm – 2:00 pm 2 Cyanoacrylate Glue Great Saphenous Vein Ablation: Preliminary 180-Day Follow-Up of a First-In-Man Feasibility Study of a No-Compression-No-Local-Anesthesia Technique**
J. I. Almeida¹, J. J. Javier², E. G. Mackay³, C. Bautista⁴, T. Proebstle⁵
¹Miami Vein Center, Miami, FL, ²Physicians Regional Vein Center, Naples, FL, ³Mackay Vein Center, St. Petersburg, FL, ⁴Canela Clinic, La Romana, Dominican Republic, ⁵University Clinic of Mainz, Mainz, Germany
- 2:00 pm – 2:15 pm 3 (BEST PAPER—ROYAL SOCIETY VENOUS FORUM)
The Long-Term Effect of Foam Sclerotherapy on Chronic Venous Leg Ulcers with Superficial Venous Reflux**
F. J. Slim, S. R. Kulkarni, L. G. Emerson, C. Davies, R. A. Bulbulia, M. R. Whyman, K. R. Poskitt
Cheltenham General Hospital, Cheltenham, United Kingdom
- 2:15 pm – 2:30 pm 4 Occlusion Rate with Foam Sclerotherapy for the Treatment of Greater Saphenous Vein Incompetence: A Multicentric Study of 3170 Cases**
J. H. Ulloa, Jr.
Clinica de Venas, Bogota, Colombia
- 2:30 pm – 2:45 pm 5 Increasing Ablation Distance Peripheral to the Saphenofemoral Junction May Result in a Diminished Rate of EHITs**
M. Sadek, L. S. Kabnick, T. Berland, L. E. Giammaria, D. Zhou, F. Mussa, N. S. Cayne, T. Maldonado, C. B. Rockman, G. R. Jacobowitz, P. J. Lamparello, M. A. Adelman
New York University Medical Center, New York, NY

2:45 pm – 2:50 pm	<p>QS-1 970-nm Laser Versus 1470-nm Laser: Modeling of Endovenous Laser Ablation (In Vitro)</p> <p>E. Shaidakov, E. Ilyukhin <i>Medical Academy, Saint-Petersburg, Russian Federation</i></p>
2:50 pm – 2:55 pm	<p>QS-2 Disparity in Healthcare Provision in Patients with Varicose Veins</p> <p>A. D. Lifshitz¹, H. M. Moore², A. S. Gaweesh², A. Thapar², J. Shalhoub², A. H. Davies² ¹<i>Academic Section of Vascular Surgery, Imperial College London—Hospital Italiano Buenos Aires—Argentina, London, United Kingdom,</i> ²<i>Academic Section of Vascular Surgery, Imperial College London, London, United Kingdom</i></p>
2:55 pm – 3:00 pm	<p>QS-3 The Progression of the Anterior Accessory Vein After Radiofrequency Segmental Thermal Ablation (RSTA) of Incompetent Great Saphenous Veins—A 4 Year Single Center Experience</p> <p>T. M. Proebstle <i>University of Mainz, Mainz, Germany</i></p>
3:00 pm – 3:05 pm	<p>QS-4 Changes of Calf Muscle Deoxygenation After Foam Sclerotherapy in Patients with Superficial Venous Insufficiency</p> <p>T. Yamaki, A. Hamahata, H. Konoeda, D. Fujisawa, A. Osada, H. Sakurai <i>Tokyo Women's Medical University, Tokyo, Japan</i></p>
3:05 pm – 3:10 pm	<p>QS-5 Histological Difference Between Pulse Wave Mode and Continuous Mode of Endovenous Laser Ablation</p> <p>R. Kansaku¹, N. Sakakibara¹, T. Shimabukuro¹, H. Endo¹, A. Amano², T. Iwamura² ¹<i>Edogawa Hospital, Tokyo, Japan,</i> ²<i>Juntendo University, Tokyo, Japan</i></p>
3:15 pm – 3:45 pm	<p>Coffee Break</p>

3:45 pm – 5:45 pm		SCIENTIFIC SESSION 2 Imaging and Other Topics <i>Moderators: Seshadri Raju, MD</i> <i>Nicos Labropoulos, PhD</i>
3:45 pm – 4:05 pm	6	Venous Endovascular Simulation Training—Initial Observations M. A. Mattos ¹ , Y. Rits ^{1,2} , J. R. Rubin ^{1,2} , B. Baigorri ² , O. Brown ¹ ¹ Wayne State University, Detroit, MI, ² Detroit Medical Center/Wayne State University, Detroit, MI
4:05 pm – 4:25 pm	7	Left Common Iliac Vein Compression Is Not Uncommon CT Finding M. Nazzal, M. Elfedaly, W. Qu, V. Kazan, J. Abbas, G. Zelenock University of Toledo Medical Center, Toledo, OH
4:25 pm – 4:45 pm	8	Responsiveness of Individual Questions from the Venous Clinical Severity Score and the Aberdeen Varicose Vein Questionnaire C. R. Lattimer, E. Kalodiki, M. Azzam, G. Geroulakos Ealing Hospital & Imperial College, London, United Kingdom
4:45 pm – 5:05 pm	9	ECG-Gated Dynamic Magnetic Resonance Is the Preferred Imaging Modality for May-Thurner Syndrome C. A. Duran ¹ , L. Abboud ² , A. B. Lumsden ¹ , D. Shah ² , J. Bismuth ¹ ¹ The Methodist DeBakey Heart and Vascular Institute, Houston, TX, ² The Methodist Hospital, Houston, TX
5:05 pm – 5:25 pm	10	Prospective Comparison of Iliac Vein Compression Using Computed Tomography R. J. Meisner, M. Gavalas, A. Tassiopoulos, A. Gasparis, N. Labropoulos Stonybrook University Hospital, Stony Brook, NY

5:25 pm – 5:45 pm 11 **Effect of Body Mass Index on Lower
Extremity Duplex Ultrasonography**
J. Heller
Johns Hopkins, Baltimore, MD

6:00 pm – 7:30 pm **WELCOME RECEPTION**
In Exhibit Hall

Thursday, February 9, 2012

SCHEDULE

7:00 am – 8:00 am		Continental Breakfast/Exhibits Open
8:00 am – 10:00 am		SCIENTIFIC SESSION 3 Deep Vein Thrombosis I <i>Moderators: Peter Henke, MD</i> <i>Susan Kahn, MD</i>
8:00 am – 8:20 am	12	Predicting 60-Day Venous Thromboembolism Risk in Plastic and Reconstructive Surgery Patients: A Comparison of the 2005 and 2010 Caprini Risk Assessment Models P. R. Portschy ¹ , C. J. Pannucci ² , J. Barta ¹ , G. Dreszer ¹ , R. E. Hoxworth ³ , L. K. Kalliainen ¹ , E. G. Wilkins ² ¹ University of Minnesota, Minneapolis, MN, ² University of Michigan, Ann Arbor, MI, ³ University of Texas Southwestern, Dallas, TX
8:20 am – 8:40 am	13	Non-Lipid-Lowering Effects of Rosuvastatin on Venous Thrombosis in a Mouse Model of DVT E. DeRoo, S. K. Wroblewski, A. E. Hawley, N. E. Ballard-Lipka, L. Brentin, D. D. Myers, T. W. Wakefield, J. A. Diaz University of Michigan, Ann Arbor, MI
8:40 am – 9:00 am	14	Reporting the Impact of Inferior Vena Cava Perforation by Filters E. A. Wood, R. D. Malgor, A. P. Gasparis, N. Labropoulos Stony Brook University Medical Center, Stony Brook, NY
9:00 am – 9:20 am	15	Factors Increasing Risk of Venous Thromboembolism After Arterial Reconstructive Procedures L. Mureebe, M. Ghandi, C. K. Shortell Duke University Medical Center, Durham, NC

9:20 am – 9:40 am	16	Strategy of Thrombus Removal for Extensive DVT of Pregnancy S. Herrera, S. Thakur, S. Sunderji, R. DiSalle, S. N. Kazanjian, Z. Assi, A. J. Comerota <i>The Toledo Hospital, Toledo, OH</i>
9:40 am – 9:45 am	QS-6	Percutaneous Femoral Vein Access for Inferior Vena Cava Filter Placement Does Not Cause Insertion Site Thrombosis: A Prospective Study B. D. Lambe ¹ , J. J. Bedway ² , M. L. Friedell ² ¹ University of Central Florida College of Medicine, Orlando, FL, ² Orlando Health, Orlando, FL
9:45 am – 9:50 am	QS-7	Internal Jugular Approach for CTD During Treatment of IFDVT Causes No Mechanical Damage and No Venous Valvular Incompetence J. L. Martinez-Trabal, M. Rivera-Rodriguez, R. Figueroa Vicenty, L. Torruella <i>Caribbean Vascular Center, Ponce, PR</i>
9:50 am – 9:55 am	QS-8	Midterm Outcomes of Endovascular Treatment for Iliofemoral Deep Venous Thrombosis (DVT) H. Khan ^{1,2} , M. Gardner ^{1,2} , Z. Kostun ^{1,2} , H. Dosluoglu ^{1,2} , L. Harris ^{1,2} , A. Coulter ^{1,2} ¹ State University of New York at Buffalo, Buffalo, NY; ² VA Western New York Healthcare System, Buffalo, NY
9:55 am – 10:10 am		ACP BEST PAPER Inelastic Compression in Mixed Ulcers Increases Arterial Inflow and Venous Output G. Mosti ¹ , H. Partsch ¹ ¹ MD Barbantini Hospital, Lucca, Italy, ² Private practice, Wien, Italy
10:10 am – 10:50 am		Coffee Break

10:50 am – 12:30 pm		SCIENTIFIC SESSION 4 Venous Potpourri <i>Moderators: Harold Welch, MD</i> <i>Ashman Mansour, MD</i>
10:50 am – 11:10 am	17	Value of Postoperative Compression After Surgical Treatment of Varicose Veins P. Pittaluga, S. Chastanet <i>Riviera Veine Institut, Nice, France</i>
11:10 am – 11:30 am	18	Contemporary Results Following Saphenopopliteal Transposition for Chronic Femoral Vein Occlusion D. M. Coleman, J. E. Rectenwald, F. C. Vandy, T. W. Wakefield <i>University of Michigan, Ann Arbor, MI</i>
11:30 am – 11:50 am	19	Liberation Procedure in the Treatment of Chronic Cerebro-Spinal Venous Insufficiency—Is Chronic Cerebro-Spinal Venous Insufficiency Related to Brain Congestive Syndrome Rather than Multiple Sclerosis D. J. Milic, P. Bosnjakovic, S. Vojinovic, Z. Sasa, A. Ilic, D. Stojanov, V. Milojkovic <i>Clinical Centre Nis, Nis, Serbia</i>
11:50 am – 12:10 pm	20	Design of a Vein Valve Replacement D. N. Ku ¹ , P. Midha ² ¹ <i>Emory School of Medicine, Atlanta, GA,</i> ² <i>Georgia Institute of Technology, Atlanta, GA</i>
12:10 pm – 12:15 pm	QS-9	Long-Term Results of Class 3 Compression Therapy Alone Versus Class 2 Compression Plus Surgery in the Treatment of Venous Leg Ulcers—Randomised Controlled Trial D. J. Milic, S. Zivic, D. Bogdanovic, V. Milojkovic <i>Clinic for Vascular Surgery, Clinical Centre Nis, Nis, Serbia</i>

12:15 pm – 12:20 pm QS-10 Changes in Perforator Vein Size and Reflux with Endovenous Ablation of Great Saphenous Vein (GSV)

E. McDonald, C. Dunn, L. Plowman
*Crighton, Olive, Dunn Surgical Group,
Springfield, MO*

12:30 pm – 2:00 pm VILLAVICENCIO SYMPOSIUM ON AV MALFORMATIONS/LYMPHOLOGY

*Moderators: Peter Gliviczki, MD
Byung B. Lee, MD*

2:00 pm – 3:30 pm ACP SYMPOSIUM

*Moderator: John Mauriello, MD
Lowell Kabnick, MD*

3:30 pm – 4:15 pm Coffee Break

4:15 pm – 6:15 pm POSTER SESSION

*Moderator: Joseph Raffetto, MD
Marc Passman, MD*

Session 1 (4:15 pm – 5:15 pm)

P1 A Novel Mouse Model to Study Thrombogenesis and Thrombus Resolution with Continuous Blood Flow in the Inferior Vena Cava

J. A. Diaz, C. E. Alvarado, S. K. Wroblewski, N. K. Baker, A. E. Hawley,
P. K. Henke, B. R. Lucchesi, T. W. Wakefield, D. D. Myers
University of Michigan, Ann Arbor, MI

P2 Systematic Review of Sonographic CCSVI Findings in Multiple Sclerosis

A. Thapar, T. Lane, R. Nicholas, T. Friede, M. Ellis, J. Assenheim,
I. J. Franklin, A. H. Davies
Imperial College London, London, United Kingdom

P3 The High Incidence of Depression in Chronic Venous Disease

K. Sritharan, T. Lane, A. Davies
Imperial College, London, United Kingdom

P4 Prevalence of Vascular Anomalies in Klippel-Trenaunay Syndrome

T. Yamaki, A. Hamahata, H. Konoeda, D. Fujisawa, A. Osada, H. Sakurai
Tokyo Women's Medical University, Tokyo, Japan

- P5 Retention of an Autologous Endothelial Layer on a Bioprosthetic Valve for the Treatment of Chronic Deep Venous Insufficiency**
C. M. Jones, M. T. Hinds, D. Pavcnik
Oregon Health&Science University, Portland, OR
- P6 Comparison of Diagnostic Methods for Iliocaval Venous Obstruction**
C. Koksoy, Z. Unal, E. Arslan, A. Arat
Ankara University, Ankara, Turkey
- P7 The Vein Wall Remodelling Activities of Doxycycline and Micronized Purified Flavonoid Fraction Are Likely Hypoxia-Inducible Factor Pathway Independent**
C. S. Lim, S. Kiriakidis, E. Paleolog, A. H. Davies
Imperial College London, London, United Kingdom
- P8 Does Ultrasound Guided Compression of the Saphenofemoral Junction During Endovenous Laser Ablation Reduce the Incidence of Heat-Induced Thrombus Formation?**
R. Shah, J. Lin
Henry Ford Hospital, Detroit, MI
- P9 Plasma Level of Adiponectin Inversely Correlates with the Severity of Secondary Lymphedema in Lower Extremity**
N. Unno, T. Saito, H. Tanaka, N. Yamamoto, M. Suzuki, Y. Mano, M. Sano, H. Konno
Hamamatsu University School of Medicine, Hamamatsu, Japan
- P10 Our Early Experience in Stenting Iliofemoral Veins**
M. Kurtoglu, M. Aksoy, I. S. Sarici, A. Ucar, Arzu Poyanli
Istanbul University, Istanbul, Turkey
- P11 Do We Know Exact Relationship of Fiber-Tip and Proximal Vein Segment in Endovenous Laser Ablation?—Consideration of Avoidance of Proximal Thrombotic Complication**
S. Shokoku
Varix Ambulatory Surgery Center, Okayama Daiichi Hospital, Okayama-shi, Japan
- P12 Multicenter Evaluation of a Novel Patient Reported Outcome Tool for Assessing Efficacy of Varisolve™ Polidocanol Endovenous Microfoam (PEM) for Treatment of Symptomatic Visible Varicose Veins with Saphenofemoral Junction (SFJ) Incompetence: The ProtoSymQ**
K. Gibson
Lake Washington Vascular, Bellevue, WA

Session 2 (5:15 pm – 6:15 pm)

- P13 Surgical Bypass for Non-Malignant Occlusive Disease in Inferior Vena Cava and Iliac Veins: Is it Still an Option?**
J. E. Anaya-Ayala, M. K. Adams, N. Ismail, C. J. Smolock, J. A. Leon-Becerril,
B. A. Johnson, M. G. Davies, A. B. Lumsden, E. K. Peden
Methodist DeBakey & Vascular Center, Houston, TX
- P14 Incidence of Iliocaval Venous Obstruction in Patients with Venous Ulcer**
C. Koksoy, Z. Unal, E. Arslan, M. Arbatli, U. Sanlidilek
Ankara University, Ankara, Turkey
- P15 Correlation of 3-Dimensional CT Venography with Intravascular Ultrasound in the Diagnosis of Ilio-Caval Venous Outflow Obstruction**
W. Marston, J. Crowner
University of North Carolina, Chapel Hill, NC
- P16 Despite Informed Consent Patients Understanding of the Risks & Benefits of Endovenous Therapy Is Poor**
K. Sritharan, A. Davies
Imperial College, London, United Kingdom
- P17 Pulsatile Ante-Grade Great Saphenous Flow Is Associated with Severe Chronic Superficial Venous Insufficiency**
C. R. Lattimer, M. Azzam, G. C. Makris, E. Kalodiki, S. Somaiyajulu,
G. Geroulakos
Ealing Hospital & Imperial College, London, United Kingdom
- P18 Major Venous Reconstruction During Abdominal Oncologic Surgery**
S. Min, S. M. Kim, I. M. Jung, T. Lee, J. Ha, J. K. Chung, S. J. Kim
Seoul National University Hospital, Seoul, Korea
- P19 Interface Pressure Under Compression Bandages: Current Practice and a Way to Consiste**
F. Lurie, R. L. Kistner
Kistner Vein Clinic and University of Hawaii, Honolulu, HI
- P20 Adjustable Compression Wraps Are a Clever Alternative to Conventional Multi-Component Bandaging in the Initial Treatment of Leg Lymphedema**
R. J. Damstra¹, D-A.A. Lamprou¹, H. Partsch²
¹Department of Dermatology, Phlebology and Lymphology, Nij Smellinghe Hospital, Drachten, The Netherlands; ²Private Practice, Vienna, Austria

- P21 Minimally Invasive Treatment of Chronic Ilio-Femoral Venous Occlusive Disease**
M. de Wolf¹, C. Arnoldussen¹, R. de Graaf¹, M. de Haan¹, J. Grommes², C. Wittens¹
¹Maastricht University Medical Center, Maastricht, Netherlands, ²Aachen University Hospital, Aachen, Germany
- P22 Changes in Venous Reflux After Iliac Vein Stenting**
A. Faisal AL-Taie, A. Hingorani, E. Ascher, R. Jimenez, E. Aboian, N. Marks, T. Jacob
Maimonides Medical Center, Brooklyn, NY
- P23 Five-Year Delayed Removal of Symptomatic, Migrated Retrievable Inferior Vena Cava Filter**
E. J. Moreno-Martinez, L. Choi, C. C. Cheng, M. B. Silva, Jr.
UTMB, Galveston, TX
- P24 Preoperative Lymph Mapping Together with Vein Mapping Is Useful to Prevent Postoperative Lymphorrhea in Paramalleolar Bypass in Patients with Critical Limb Ischemia**
N. Unno, H. Tanaka, N. Yamamoto, M. Suzuki, H. Konno
Hamamatsu University School of Medicine, Hamamatsu, Japan

Friday, February 10, 2012

7:00 am – 7:30 am		Continental Breakfast
7:30 am – 9:15 am		SCIENTIFIC SESSION 5 Chronic Venous Insufficiency <i>Moderators: Thomas O'Donnell, MD</i> <i>David Gillespie, MD</i>
7:30 am – 7:50 am	21	Variables Affecting Healing of Venous Leg Ulcers in a Randomized, Vehicle-Controlled Trial of Topical Cellular Therapy W. Marston ¹ , R. Kirsner ² , R. Snyder ³ , T. Lee ⁴ , I. Cargill ⁴ , H. Slade ⁴ <i>¹University of North Carolina, Chapel Hill, NC, ²University of Miami Leonard Miller School of Medicine, Miami, FL, ³Barry University School of Podiatric Medicine, Miami Shores, FL, ⁴Healthpoint Biotherapeutics, Ft. Worth, TX</i>
7:50 am – 8:10 am	22	Venous Ulcers' Prevalence Study in Olmsted County—to Measure the Success of the Venous Ulcer Initiative M. L. Gloviczki ¹ , H. Kalsi ² , J. Heit ² , The AVF Ulcer Initiative Committee members: E. Cummings, B. Eklof, D. Gillespie, M. Gloviczki, P. Henke, R. Kistner, F. Lurie, W. Marston, T. O'Donnell, M. Passman, L. Pounds, T. Wakefield <i>¹American Venous Forum, Rochester, MN, ²Mayo Clinic, Rochester, MN</i>
8:10 am – 8:30 am	23	Long-Term Outcomes of Endovascular Intervention for May-Thurner Syndrome E. S. Hager ¹ , R. Tahara ² , E. Dillavou ¹ , G. Al-Khoury ¹ , T. Yuo ¹ , R. Rhee ¹ , L. Marone ¹ , M. Makaroun ¹ , R. A. Chaer ¹ <i>¹University of Pittsburgh Medical Center, Pittsburgh, PA, ²Bradford Regional Medical Center, Bradford, PA</i>

8:30 am – 8:50 am	24	Outcomes and Predictors of Secondary Intervention for Chronic Venous Insufficiency Following Endovenous Radiofrequency Ablation K. R. Diamond, M. S. Hong, D. Shelpman, P. R. Nelson <i>University of Florida College of Medicine, Gainesville, FL</i>
8:50 am – 9:10 am		EUROPEAN VENOUS FORUM—BEST PAPER 1 Endovenous Laser Treatment of the Great Saphenous Vein Using a Bare Fibre Versus Tulip Fibre—Short Term Results of the Tulip-Trial (ISRNTN51287398) Y. Goubau ¹ , P. Mahieu ¹ , M. Vuylsteke ¹ , S. Thomis ² , I. Fournau ² , S. Mordon ³ <i>¹Department of Vascular Surgery, Sint-Andriesziekenhuis Tielt, Belgium, ²Department of Vascular Surgery, Universitair Ziekenhuis Gasthuisberg, Leuven, Belgium, ³INSERM U 703, Université Lille Nord de France, CHRU Lille France</i>
9:15 am – 9:45 am		Coffee Break
9:45 am – 11:45 am		SCIENTIFIC SESSION 6 President's Session <i>Moderators: Seshadri Raju, MD Robert McLafferty, MD</i>
9:45 am – 10:00 am		2011 Servier Traveling Fellowship Reports 2 Winners Provide Update of EVF Meeting Experience
10:00 am – 10:15 am		2011 BSN Jobst Research Winner—Interim Report
10:15 am – 10:20 am		American Venous Registry Update
10:20 am – 10:25 am		National Venous Screening Update

10:30 am – 10:45 am

Presidential Address Introduction

*Introduction By: Robert McLafferty MD,
President-Elect*

10:45 am – 11:30 am

PRESIDENTIAL ADDRESS

**Keeping an Open Mind—Three
Different Ways**

Seshadri Raju, MD

11:30 am – 12:30 pm

MEMBER BUSINESS LUNCHEON

1:00 pm – 5:30 pm

**SPECIALTY SYMPOSIA
(CONCURRENT)**

(Limited Seating—Registration Required)

1:00 pm – 3:00 pm

**(A) VASCULAR MEDICINE &
THROMBOSIS**

1:00 pm – 5:30 pm

**(B) BIOMECHANICS &
BIOENGINEERING**

1:00 pm – 5:30 pm

(C) WOUND CARE & COMPRESSION

*Chairs: William Marston, MD
Hugo Partsch, MD*

3:00 pm – 3:30 pm

Coffee Break

3:30 pm – 5:30 pm

(D) LIVE VENOUS ULTRASOUND

Saturday, February 11, 2012

SCHEDULE

7:00 am – 8:00 am		Continental Breakfast
8:00 am – 10:00 am		SCIENTIFIC SESSION 7 Chronic Venous Disease <i>Moderators: Antonios Gasparis, MD Cees Wittens, MD</i>
8:00 am – 8:20 am	25	Soluble P-Selectin for the Diagnosis of Lower Extremity Deep Venous Thrombosis F. C. Vandy ¹ , C. Stabler ¹ , A. E. Hawley ¹ , N. Ballard-Lipka ¹ , K. E. Guire ² , N. Baker ¹ , D. D. Myers ¹ , J. E. Rectenwald ¹ , P. K. Henke ¹ , T. W. Wakefield ¹ <i>¹University of Michigan, Ann Arbor, MI, ²Department of Biostatistics, School of Public Health, University of Michigan, Ann Arbor, MI</i>
8:20 am – 8:40 am	26	Deep Venous Thrombosis After Abdominal Aneurysm Repair E. Xenos, D. Davenport <i>University of Kentucky Medical Center, Lexington, KY</i>
8:40 am – 9:00 am	27	Thrombolytic Therapy for Significant Pulmonary Emboli G. Purdy ¹ , H. McKeever ² , T. Khoury ³ <i>¹Shawnee State University, Portsmouth, OH, ²Ohio University College of Osteopathic Medicine, Athens, OH, ³Southern Ohio Surgical Associates, Portsmouth, OH</i>
9:00 am – 9:20 am	28	A Therapeutic Education Program for the Prevention of the Post-Thrombotic Syndrome P. H. Carpentier ¹ , B. Satger ¹ , M. Barrellier ² , C. Menez ¹ , J. Kubina ³ , B. Sandrin-Berthon ⁴ <i>¹Grenoble University Hospital, Grenoble, France, ²Caen University Hospital, Caen, France, ³La Roche sur Yon Hospital, La Roche sur Yon, France, ⁴Centre Regional d'Education pour la Sante Languedoc Roussillon, Montpellier, France</i>

9:20 am – 9:40 am	29	<p>Ultrasound Accelerated Catheter Directed Thrombolysis in Patients with Acute Iliofemoral Deep Vein Thrombosis and in Stent Thrombosis: Clinical Experience</p> <p>R. H. W. Strijkers¹, J. Grommes², A. J. Ten Cate¹, H. Ten Cate¹, C. H. A. Wittens¹</p> <p>¹Maastricht University Medical Center, Maastricht, Netherlands, ²University Hospital RWTH Aachen, Aachen, Germany</p>
9:40 am – 9:55 am		<p>EUROPEAN VENOUS FORUM—BEST PAPER 2</p> <p>Endogenous Markers of Thrombogenesis Are Significantly Increased in Patients with Varicose Veins</p> <p>C. R. Lattimer, E. Kalodiki, D. Hoppensteadt, Z. Chaudhry, J. Fareed, AN Nicolaides, G. Geroulakos</p> <p><i>Josef Pflug Vascular Unit, Ealing Hospital and Imperial College, London, UK; Thrombosis & Haemostasis Research Laboratory, Loyola University Medical Centre, Maywood, IL, USA; Department of Biomedical Sciences, University of Cyprus, Nicosia, Cyprus</i></p>
10:00 – 10:30 am		Coffee Break
10:40 am – 11:30 am		<p>D. EUGENE STRANDNESS MEMORIAL LECTURE</p> <p>Venous and Arterial Thrombosis: Is There a Link?</p> <p>Paolo Pandoni, MD, PhD</p> <p><i>Chair, Internal Medicine, University of Padova, Padova, Italy</i></p>
11:30 am – 1:00 pm		Lunch on Own
1:00 pm – 3:00 PM		<p>SCIENTIFIC SESSION 8</p> <p>Deep Vein Thrombosis 2</p> <p>Moderators: Peter Pappas, MD Robert McLafferty, MD</p>
1:00 pm – 1:20 pm	30	<p>Chronic Venous Insufficiency from an Internist's Perspective: Results of the Pri-Med Questionnaire</p> <p>J. Heller</p> <p><i>Johns Hopkins, Baltimore, MD</i></p>

1:20 pm – 1:40 pm	31	Is There a Relationship Between Increased Body Mass Index and Primary Venous Disease Severity and Concomitant Primary Deep Venous Reflux? J. T. Christenson, L. Vines, G. Gemayel <i>University Hospital of Geneva, Faculty of Medicine, University of Geneva, Geneva, Switzerland</i>
1:40 pm – 2:00 pm	32	Population-Based Analysis of Venous Thrombotic Events Following Saphenous Ablation J. Benarroch-Gampel, K. M. Sheffield, C. A. Boyd, T. S. Riall, L. A. Killewich <i>University of Texas Medical Branch, Galveston, TX</i>
2:00 pm – 2:20 pm	33	Increased Estrogen Receptor-Mediated Venous Relaxation in Human Varicose Veins J. D. Raffetto ¹ , O. M. Reslan ² , R. A. Khalil ² ¹ VA Boston HCS, West Roxbury, MA, ² Brigham and Women's Hospital, Boston, MA
2:20 pm – 2:40 pm	34	Which Is More Important for Postoperative Recovery: Laser Wavelength or Fibers? L. S. K. Kabnick <i>New York University, New York, NY</i>
2:40 pm – 2:45 pm	QS-11	Great Saphenous Vein Diameter Is Associated with Venous Clinical Scores, But Not Quality of Life A. C. Shepherd, T. R. A. Lane, M. S. Gohel, A. H. Davies <i>Imperial College, London, United Kingdom</i>
2:45 pm – 2:50 pm	QS-12	Implications of the Expanded Venous Reflux Study D. M. Coleman, D. Campbell, K. Shuster, S. Brown, C. Stabler, T. W. Wakefield <i>University of Michigan, Ann Arbor, MI</i>
3:00 pm – 7:00 pm		Free Afternoon
7:30 pm – 10:00 pm		THE FORUM FINALE <i>Awards, Dinner, Entertainment & More!</i>



AMERICAN VENOUS FORUM 24TH ANNUAL MEETING

February 8–11, 2012
Loews Royal Pacific | Orlando, Florida

Wednesday, February 8, 2012

7:00 am – 8:00 am

Continental Breakfast

8:00 am – 12:00 pm

DAVID S. SUMNER VENOUS SUMMIT
True Controversies in Venous Disease

Introduction: Seshadri Raju, MD,
President
Robert McLafferty, MD,
President-Elect

Educational Objectives: At the conclusion of this session the participant/ attendee/learner should be able to: 1) To investigate and expound upon the dichotomy and controversy surrounding the placement of IVC filters for in trauma patients and to inform the attendees of the evidence behind different approaches as to why or why not a IVC filter should be placed in a trauma patient; 2) To understand the the pathophysiology of multiple sclerosis and the new novel treatment of chronic cerebrospinal venous insufficiency caused by internal jugular vein stenosis or obstruction and to further understand the challenges of moving forward in an evidence-based manner for this new novel treatment; 3) To understand why there are difference in the approach of treatment of varicose veins—varying from complete treatment with foam

sclerotherapy to combination multi-modality treatment and to understand the forces that lead to these dramatically different approaches and whether there are differences in outcomes; 4) To understand the differences in evidence-based guidelines for prophylaxis against deep venous thrombosis between the American College of Chest Physicians and the American Association of Orthopedic Surgery and to understand the implications of these differences in these recommendations from a specialty and outcome perspective; 5) To understand the pathophysiology of varicose veins, to understand the differences in theory of varicose vein development and to understand how these differences in development may affect evaluation and treatment recommendations.

WEDNESDAY

Controversy #1: The Role of Inferior Vena Cava Filters in Trauma Patients

Pro: Herb Phelan, MD

Con: William Geertz, MD

Controversy #2: The Role of Endovascular Treatment of CCSVI and Multiple Sclerosis

Pro: Paolo Zamboni, MD

Con: Alexander Rae-Grant, MD

Controversy #3: The Role of Foam Sclerotherapy for the Majority of Varicose Vein Treatment

Pro: Alun Davies, MD

Con: Jose Almeida, MA

Break

Controversy #4: The Role of the ACCP vs. AAOS Guidelines in Perioperative Venous Thromboembolism Prophylaxis

Pro (AAOS): James Douketis, MD

Con (ACCP): Joseph Caprini, MD

Controversy #5: The Role of Primary Valve Dysfunction in the Development of Varicose Veins

Pro: Timothy Liem, MD

Pro: Joseph Raffetto, MD

12:00 pm – 1:15 pm

Lunch on Own

1:30 pm – 3:10 pm

SCIENTIFIC SESSION 1
Superficial Vein Disease/Sclerotherapy

Moderators: Lowell Kabnick, MD
Fedor Lurie, MD
Jose Almeida, MD

Educational Objectives: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Describe and apply endovenous (thermal and chemical) modalities for closure of the refluxing saphenous vein; 2) Describe potential tumescentless procedures; 3) Be able to recognize and treat recurrent varicose veins; 4) Describe Endothermal Heat Induced Thrombosis and be able to decrease the incidence of this possible complication.

1:30 pm – 1:45 pm 1

Factors Associated with Recurrence of Varicose Veins After Thermal Ablation: 3-Year Results of the REVATA (Recurrent Veins After Thermal Ablation) Study

R. G. Bush¹, P. Bush¹, J. Flanagan², R. Fritz³,
T. Gueldner⁴, J. Koziarski⁵, K. McMullen⁶,
G. Zumbro⁷

¹Midwest Vein & Laser Center, Centerville, OH,
²Delaware Valley Vein Center, Phoenixville, PA,
³Advanced Vein Center of North Texas, Irving, TX,
⁴Wisconsin Vein Center, Manitowoc, WI,
⁵Family Surgical, Battlecreek, MI, ⁶Varicose Vein Clinics of Oklahoma, Oklahoma City, OK, ⁷Vein Specialists of Augusta, Martinez, GA

BACKGROUND: Factors contributing to recurrence of varicose veins after thermal ablation are not well known. The goal of this prospective, non-randomized, multi-center trial was to determine the site, source, and contributory factors of varicose vein recurrence after radiofrequency (RF) and laser ablation.

METHODS: Seven centers enrolled patients into the study during a twelve-month period, from January 1st, to December 31st, 2010. All patients underwent previous thermal ablation of the great saphenous vein (GSV), small saphenous vein (SSV) or anterior accessory great saphenous vein (AAGSV). Patients with high ligation of the GSV and/or stripping were excluded from the study. From a specific designed study tool, recurrence was identified as to site, etiology, and primary mode of treatment (RF, laser).

RESULTS: 2,380 patients were evaluated during this time frame. A total of 164 patients, (7%), 3 with bilateral limb involvement, had varicose vein recurrence at a mean of 3 years after treatment (range: 9 months to 8 years) This group of 164 patients with varicose vein recurrence were the subjects of this study.

33% were between the age of 51 and 60, median age range was 51–60, and 83% were women. A history of deep venous thrombosis (DVT) was present in 2% of the patients and deep venous insufficiency was present in 17%. GSV ablation was the initial treatment in 159 patients (RF: 33, laser: 131, 52 of these patients had either SSV or AAGSV ablation concurrently. Total or partial GSV recanalization occurred in 47 patients (29%). Of these 47 patients, 27 had RF ablation, and 20 had laser thermal ablation. New AAGSV reflux occurred in 40 patients (24%), and new SSV reflux occurred in 24 patients (12%) Primary or associated perforator pathology was present in 64% of patients.

CONCLUSIONS: Recurrence of varicose veins at 3 years after thermal ablation was 7%. The three most important factors associated with varicose vein recurrence included new or recurrent perforating veins; recanalized GSV and new AAGSV reflux, in decreasing frequency. In this study, patients who underwent RF treatment had a higher rate of GSV recanalization than those who were treated with laser.

WEDNESDAY

1:45 pm – 2:00 pm 2

Cyanoacrylate Glue Great Saphenous Vein Ablation: Preliminary 180-Day Follow-Up of a First-In-Man Feasibility Study of a No-Compression-No-Local-Anesthesia Technique

J. I. Almeida¹, J. J. Javier², E. G. Mackay³,
C. Bautista⁴, T. Proebstle⁵

¹Miami Vein Center, Miami, FL, ²Physicians Regional Vein Center, Naples, FL, ³Mackay Vein Center, St. Petersburg, FL, ⁴Canela Clinic, La Romana, Dominican Republic, ⁵University Clinic of Mainz, Mainz, Germany

BACKGROUND: Endovenous thermal ablation is a highly effective technology for the treatment of incompetent great saphenous veins (GSVs). However, the treatment requires painful transcutaneous injection of perivenous anesthetic fluids. Graduated compression hose are required post-procedure to help mitigate the inflammatory side-effects of thermal delivery. This study was conducted to demonstrate the safety and efficacy of the Sapheon Closure System for chemical ablation of duplex proven incompetent great saphenous veins.

METHODS: Two series of patients were treated (n = 8 and n = 30 follow-up of 180 and 30 days, respectively). After venous access and placement of a novel delivery system, the vein was sealed with a proprietary cyanoacrylate (CA) formulation. Perivenous tumescent anesthesia and post-procedure compression stockings were omitted.

RESULTS: Thirty-eight patients (29 female) with a median age of 51 years (range 26–77) and an average VCSS score of 6.0 ± 2.7 (range 2–17) received study treatment. Average maximum saphenofemoral junction (SFJ) diameter was 8.0 ± 2.2 cm (range 4.1–12.0) before treatment. The mean length of ablated GSV segments was 33 cm (range 15–52), average treatment duration was 20.3 minutes (range 11–33). The mean volume of CA delivered was a total of 1.3 ml (range 0.63–2.25). Immediately post-procedure, and at 24–72 hours, 100% (38 of 38) were closed. At 30 days follow-up 97% (35 of 36) of treated GSV segments were completely closed; one limb had a 1 cm segment of incomplete ablation. VCSS scores improved to a mean of 1.9 ± 2.1 (range 0–11; $p < 0.001$ compared to baseline) at 30 days in 37 patients. Of the eight patients followed for 180 days, average VCSS improved to 1.1 ± 1.0 (range 0–3). Thirty-one of 37 patients reported no pain during the 30 days after treatment; the remaining six were successfully treated with NSAIDs. No significant side effects or complications were observed.

CONCLUSION: Endovenous ablation of incompetent GSVs with a CA-based glue is feasible. Procedure times are short, tumescent anesthesia is unnecessary as are post-procedure compression stockings. Lack of significant side-effects and an initial success rate of 100% with significant, long-standing, improvement of clinical symptoms support further clinical studies.

2:00 pm – 2:15 pm 3

(BEST PAPER—ROYAL SOCIETY
VENOUS FORUM)

**The Long-Term Effect of Foam
Sclerotherapy on Chronic Venous Leg
Ulcers with Superficial Venous Reflux**

F. J. Slim, S. R. Kulkarni, L. G. Emerson,
C. Davies, R. A. Bulbulia, M. R. Whyman,
K. R. Poskitt

*Cheltenham General Hospital, Cheltenham,
United Kingdom*

WEDNESDAY

BACKGROUND: The ESCHAR trial showed that superficial venous surgery and compression in chronic venous ulcers achieved a 24 week healing rate of 65%, 12 month recurrence rate of 12% and 4 year recurrence rate of 31%. Foam sclerotherapy may be an attractive alternative to surgery. The aim of this study is to assess the effect of foam sclerotherapy on ulcer healing and long term recurrence in chronic venous leg ulcers. This is an expanded study of the abstract presented at the Royal Society of Medicine Venous Forum reporting long term recurrence data.

METHODS: Chronic venous leg ulcers (CEAP 5 and CEAP 6) with superficial venous reflux were treated between March 2006 and August 2011 with ultrasound guided foam sclerotherapy and compression. Venous duplex was performed on all legs before and one week after treatment. 24-week ulcer healing and 1 and 4 year ulcer recurrence rates were analysed using Kaplan-Meier survival analysis.

RESULTS: Two hundred and fourteen legs (199 patients) with chronic venous ulcers (CEAP 5: n = 173, CEAP 6: n = 41) were treated with foam sclerotherapy. Median age was 73 years (range 29–92, M:F = 87:112). Complete occlusion was achieved in 195/214 (91.1%) legs, short segment occlusion in 16/214 (6.5%) legs and 3/214 failed to occlude. One patient suffered non-occlusive DVT diagnosed on duplex scan at 1 week and one presented with an occlusive DVT at 3 weeks following a normal scan at 1 week. One patient developed asymptomatic occlusive DVT at two weeks following a non-occlusive DVT diagnosed on initial 1 week scan. Eighteen patients were lost to follow up (3 moved away and 15 died of unrelated cause). Twenty four week healing rate was 70.7% and 1 and 4 year recurrence rate were 4.7% and 28.1% respectively.

CONCLUSION: Foam sclerotherapy is effective in abolition of superficial venous reflux contributing to favourable ulcer healing and long term recurrence rates. Foam sclerotherapy is an attractive alternative to superficial venous surgery in this group of patients.

2:15 pm – 2:30 pm 4 **Occlusion Rate with Foam Sclerotherapy
for the Treatment of Greater Saphenous
Vein Incompetence: A Multicentric
Study of 3170 Cases**

J. H. Ulloa, Jr.

Clinica de Venas, Bogota, Colombia

BACKGROUND: Foam sclerotherapy using direct access under guided ultrasound, has been the method of choice of our group for the treatment of greater saphenous vein (GSV) incompetence for the last 8 years. The practicality of this approach, low costs, no anesthesia requirement and repeatability, has encouraged other groups in Latin America to follow our example. We organized a multicentric international group in order to get mutual feedback to improve our technique and establish the potential hazards we may encounter.

METHODS: We present a prospective multicentric study where 2674 patients, 3170 limbs, C2–6, Ep, As, Pr, diagnosed with duplex scanning and operated between June 2007 and June 2011. All cases were treated with foam sclerotherapy with no other treatment associated. Lapidium clorhidrate was the sclerosant of choice due to its increased foam stability. Foam was delivered into the vein via a 21-gauge needle just below the knee; an average of 3 cc (12 cc of foam) per patient was used. Compression stockings (22 mmHg) were used in all cases. Follow-up visits were scheduled at the first week, first, 3rd, 6th and 12th months and included ultrasound surveillance to assess the occlusion of the treated vein.

RESULT: Occlusion of the GSV was achieved in 96.2% of limbs studied and 93.7% remain occluded at 12 months after treatment. Among the complications we had three DVT, one of them subclinical. Superficial thrombophlebitis in 17, induration in 390 and dyschromia in 46 cases. We had one major incident: a pneumonitis that required ICU hospitalization for 5 days and were successfully discharged.

CONCLUSIONS: Foam sclerotherapy is a safe method that showed a high occlusion rate. The possibility of adverse effects has to be taken into account in order to minimize risks and be prepared to handle unavoidable complications.

2:30 pm – 2:45 pm 5

Increasing Ablation Distance Peripheral to the Saphenofemoral Junction May Result in a Diminished Rate of EHITs

M. Sadek, L. S. Kabnick, T. Berland,
L. E. Giammaria, D. Zhou, F. Mussa,
N. S. Cayne, T. Maldonado, C. B. Rockman,
G. R. Jacobowitz, P. J. Lamparello,
M. A. Adelman

*New York University Medical Center,
New York, NY*

WEDNESDAY

BACKGROUND: The treatment of venous insufficiency using endovenous laser ablation or radiofrequency ablation may result in endothermal heat induced thrombosis (EHIT), a form of deep venous thrombosis. This study sought to assess the effect of ablation distance peripheral to the deep venous system on the incidence of EHIT.

METHODS: This study was a retrospective review of a prospectively maintained database from 4/2007 to 7/2011. Consecutive patients undergoing great saphenous vein (GSV) or small saphenous vein (SSV) ablation were evaluated. Previous to 2/2011, all venous ablations were performed 2 cm peripheral to the saphenofemoral or saphenopopliteal junctions (Group I). Subsequent to 2/2011, ablations were performed 2.5 cm peripheral to the respective deep system junctions (Group II). The primary outcome was the development of EHIT II or greater, i.e. thrombus protruding into the deep venous system. Secondary outcomes included procedure-site complications such as hematomas and saphenous nerve injury. Chi-square tests were performed for all discrete variables, and unpaired Students t-tests were performed for all continuous variables. $P < 0.05$ was considered statistically significant.

RESULTS: A total of 3,526 procedures were performed, Group I (N = 2672) and Group II (N = 854). General demographics and CEAP classification did not differ significantly between the two groups. EHIT demonstrated a trend towards diminished frequency in Group II (Group I: 2.8% vs Group II: 1.6%, $P = 0.077$). There were no reported cases of EHIT III or IV in this patient cohort. Patients in Group I were treated using anticoagulation 56% of the time, and patients in Group II were treated using anticoagulation 100% of the time. The frequency of procedure site complications were low and did not differ significantly between the two groups.

CONCLUSIONS: This study suggests that changing the treatment distance from 2 cm to 2.5 cm peripheral to the deep venous junction may result in a diminished incidence of EHIT. Ongoing evaluation is required to validate these results and to reaffirm the durability of the technique.

2:45 pm – 2:50 pm **QS-1 970-nm Laser Versus 1470-nm Laser:
Modeling of Endovenous Laser Ablation
(In Vitro)**

E. Shaidakov, E. Ilyukhin

*Medical Academy, Saint-Petersburg, Russian
Federation*

BACKGROUND: There is a modern tendency to increase of laser wavelength for endovenous laser ablation. But experimental data about distinctions in mechanism of action of different wavelength lasers are still poor. This report demonstrate results of «in vitro» experiment comparing the temperature within the vein during different wavelength laser exposure and histological findings. Several energetic modes and different types of laser fibers (a bare-tip fiber and a radial fiber) were used in study. Temperature level and its kind of distribution around the fiber tip in whole blood were investigated. Absorption blood features and possibility of venous wall noncontact perforation were also studied.

METHODS: After detailed analyses of literature concerning mechanisms of laser action on vein wall tissue and optical features of blood an experimental test facility was constructed, including special software and graphic interface. Five experimental sets were conducted (15 series in each set). After endovenous laser exposure of GSV segments (in vitro) one random set underwent histological research.

RESULTS: In distance of 1 mm from fiber tip the temperature level was always less the carbonization value. The zone of critical temperature level (enough for damage tissues) looks like an extended spheroid. Temperature level near the tip is not depends on wavelength but only on energy mode. 1470-nm laser has less penetrating power versus 970-nm laser. We have no found any difference between types of laser in their influence on blood. In case of prolonged action at same point temperature level stay constant, reaching definite level. Carbonization was observed using LEED 100 j/cm in spite of fiber's or wavelength type. Carbonization took place not at all cases if LEED not above 60 j/cm, but dependence from fiber or wavelength type was not established. 1,5 mm blood layer prevents the perforation of fusible plastic with any wavelength laser's influence.

CONCLUSIONS:

1. Histological selectivity of venous wall in relation to absorption of 1470-nm laser is not confirmed.
2. There are no principal distinctions between mechanisms of action of 970-nm and 1470-nm lasers.

3. Carbonization is not depends on wavelength of laser emission.
4. Radial fiber doesn't prevent carbonization and doesn't provide an even damage of venous wall if typical energy mode is used.
5. Non-contact perforation of venous wall is impossible.
6. Further selection of minimal energy density suitable for reliable and safe ablation has still to be done.

WEDNESDAY

2:50 pm – 2:55 pm **QS-2 Disparity in Healthcare Provision in Patients with Varicose Veins**

A. D. Lifshitz¹, H. M. Moore², A. S. Gaweesh²,
A. Thapar², J. Shalhoub², A. H. Davies²

¹*Academic Section of Vascular Surgery, Imperial College London—Hospital Italiano Buenos Aires—Argentina, London, United Kingdom,*

²*Academic Section of Vascular Surgery, Imperial College London, London, United Kingdom*

BACKGROUND: The US and the UK offer different healthcare systems. This study aimed to demonstrate the trans-Atlantic burden of superficial venous disease by determining the number of individuals with potentially treatable reflux, compared with numbers actually treated.

METHODS: Prevalence and severity data pertaining to superficial venous disease was extracted from the Bonn Vein Study (BVS, Europe) and the National Venous Screening Program (NVSP, US). Population data was obtained from the US Census Bureau and from the UK Office for National Statistics. The number of superficial venous procedures in the US was obtained from the Millennium Research Group and in the UK from the National Vascular Database. This data was used to calculate numbers of individuals with potentially treatable disease. Recent health economic analysis data was used to estimate the cost of managing superficial venous disease.

RESULTS: In 2010, the total population in the US and UK were 308,745,538 and 62,300,000 respectively. Those aged between 15 and 79 years totalled 236,281,565 in the US and 48,417,000 in the UK. Approximately 714,000 varicose vein procedures were undertaken in the US in 2010 and 36,000 in the UK.

According to NVSP and BVS, the prevalence of venous disease as defined by the CEAP classification was: C0 29%, 9.6%; C1 29%, 59%; C2 23%, 14.3%; C3 10%, 13.5%; C4 7%, 2.9%; C5–C6 2%, 0.7%, respectively. 37% (NVSP) and 21% (BVS) of the population had reflux in at least one superficial vein.

If all patients with C2–C6 were offered treatment, this would equate to 517,715 treatments annually in the US and 49,957 treatments in the UK. If offering treatment to only C3–C6, these numbers would be reduced to 203,534 in the US and 27,206 in the UK. With a full economic cost per limb of US\$4000 and £1400, the annual cost for treating all patients with C2–C6 disease would be US\$814 m and £70 m.

From this data it is apparent that nearly 200,000 treatments were performed for C1 disease in the US and that in the UK 67% of patients with C2 disease were not treated.

This study is limited by a number of assumptions, for example data on disease progression, recurrence and re-interventions which were not included.

CONCLUSIONS: Superficial venous disease represents a significant health and economic burden. A sizeable gap has been identified between those individuals offered treatment and those with treatable disease. This highlights the necessity to accurately evaluate cost-benefit and define those who will benefit most from intervention in an era when medical costs are being examined by external agencies.

WEDNESDAY

2:55 pm – 3:00 pm **QS-3 The Progression of the Anterior
Accessory Vein After Radiofrequency
Segmental Thermal Ablation (RSTA)
of Incompetent Great Saphenous
Veins—A 4 Year Single Center
Experience**

T. M. Proebstle

University of Mainz, Mainz, Germany

BACKGROUND: Endothermal ablation has become a commonly used technology for occlusion of incompetent great saphenous veins (GSVs). However, it is still unclear whether primarily untreated Anterior Accessory Saphenous Veins (AASV) become incompetent during follow-up and therefore should be treated at the time of GSV ablation.

METHODS: During a prospective multicenter trial of Radiofrequency segmental thermal ablation (RSTA) of incompetent GSVs the presence and the reflux-status of accessory saphenous veins was monitored in N = 93 legs at one center. Clinical control visits including duplex-ultrasound examination were performed after 1 week, 12, 24, 36 and 48 months. Life-table analysis was used to describe frequencies and risk for presence and reflux in anterior accessory veins.

RESULTS: 82 legs (88.2%) were available for 4 year follow-up. One week after RSTA N = 43 (47%) Saphenofemoral Junctions (SFJs) presented with AASVs, showing a further increase to 72% of all SFJs at 4 years follow-up. Initially only n = 2 (2%) of all SFJs showed reflux of the AASV, however, the risk to present with a refluxing AASV constantly increased to a value of 33% at 4-year follow-up. Once an AASV has been detected at a given SFJ the conditional risk to present with reflux at 4-year follow-up was as high as 55%. Clinical relevance of refluxing AASVs as defined by indication for treatment was observed in n = 1 AASV during the first 12 months of follow-up. In subsequent years n = 2, n = 2 and n = 4 AASVs requiring treatment were detected, summing up to a total of 9 legs during 4-year follow-up.

CONCLUSIONS: During 4-year follow-up a substantial proportion of all SFJs present with an AASV but only a limited proportion shows clinically relevant reflux. However, further studies appear to be reasonable to clarify whether preventive treatment of AASVs at the time of endothermal GSV ablation would be indicated to improve long-term outcome.

3:00 pm – 3:05 pm **QS-4 Changes of Calf Muscle Deoxygenation After Foam Sclerotherapy in Patients with Superficial Venous Insufficiency**

T. Yamaki, A. Hamahata, H. Konoeda,
D. Fujisawa, A. Osada, H. Sakurai

Tokyo Women's Medical University, Tokyo, Japan

BACKGROUND: To assess the changes of calf muscle deoxygenated hemoglobin (HHb) level during light-intensity exercise after foam sclerotherapy for superficial venous insufficiency.

METHODS: Sixty limbs in 59 patients with great saphenous vein (GSV) reflux received foam sclerotherapy using 1% polidocanol-foam. Near-infrared spectroscopy (NIRS) was used to measure calf muscle HHb levels before and 3 months after foam sclerotherapy. Calf venous blood filling index (FI-HHb) was calculated on standing, then the calf venous ejection index (EI-HHb) was obtained after one tiptoe movement and the venous retention index (RI-HHb) after 10 tiptoe movements (Fig 1).

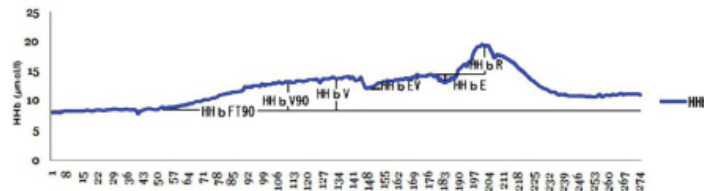


Fig. 1 NIRS examination

RESULTS: Twenty-nine limbs in 29 patients were treated with ultrasound-guided foam sclerotherapy combined with visual foam sclerotherapy and the remaining 31 limbs out of 30 patients were treated with visual foam sclerotherapy alone. At 3-month follow-up point, reflux in the GSV was absent in 41 limbs (68.3%) revealed by duplex ultrasound. Postsclerotherapy NIRS demonstrated significant reduction in the level of FI-HHb, which decreased from $0.30 \pm 0.26 \mu\text{mol/Ls}$ to $0.21 \pm 0.14 \mu\text{mol/Ls}$ ($p = 0.009$). Similarly, there was a significant reduction in the level of RI-HHb after sclerotherapy (2.13 ± 1.67 , 1.20 ± 0.94 , $p < 0.0001$, respectively). On the contrary, there was no significant difference in the level of EI-HHb before and after foam sclerotherapy (0.45 ± 0.24 , 0.50 ± 0.23 , $p = 0.225$, respectively).

CONCLUSIONS: In the past, we demonstrated that FI-HHb and RI-HHb, as measured by NIRS, are promising parameters for discriminating early chronic venous insufficiency from advanced chronic venous insufficiency. This present study suggests that changes in these parameters are also promising in assessing the effects of foam sclerotherapy in patients with superficial venous insufficiency. Future studies are needed to validate these findings.

WEDNESDAY

3:05 pm – 3:10 pm **QS-5 Histological Difference Between Pulse Wave Mode and Continuous Mode of Endovenous Laser Ablation**

R. Kansaku¹, N. Sakakibara¹, T. Shimabukuro¹,
H. Endo¹, A. Amano², T. Iwamura²

¹Edogawa Hospital, Tokyo, Japan, ²Juntendo University, Tokyo, Japan

BACKGROUND: The efficacy of endovenous laser ablation (EVLA) is affected by the linear endovenous energy density (LEED) or the endovenous fluence equivalent. However, the histological change in the vein wall after EVLA using the pulsed laser is quite different compared to using the continuous wave laser. We demonstrated the histological change in venous walls following EVLA using pulsed laser and continuous wave laser at various energy settings.

METHODS: Great saphenous veins were obtained from patients who had undergone stripping operations for varicose veins. The veins were filled with whole blood and heparin and placed in saline. EVLAs were performed using 980 nm continuous wave diode laser (980 CW), 1470 nm continuous wave diode laser (1470 CW) or 1320 nm Nd:YAG pulsed laser (1320 PW). In the group using 980 CW, the power and the velocity were (1) 10W 1.4 mm/sec (70J/cm). In the group using 1470 CW, the power and the velocity were (2) 6W 0.5 mm/sec (120 J/sec) and (3) 6W 1.0 mm/sec (60 J/sec), respectively. In the group using 1320 PW, the power, the frequency and the pulling velocity were (4) 6W 40 Hz 1.0 mm/sec (LEED 60 J/sec), (5) 6W 50Hz 1.0 mm/sec, (60 J/sec) (6) 12W 40Hz 2.0 mm/sec (60J/sec), (7) 15W 40Hz 2.0 mm/sec (75 J/sec), and (8) 18W 40Hz 2.0 mm/sec (90 J/sec), respectively.

The veins were fixed in formalin and histologically investigated using light microscopy.

RESULTS: In the group using 980 CW, 27% had developed an ulcer and 73% had suffered perforation. In the group of 1470 CW with 120 J/cm of LEED, 67% presented an ulcer and 33% showed perforation. In the group of 1470 CW with 60 J/cm of LEED, 50% had developed ulcer and 50% perforation. In the group of 1320 PW, No specimen showed perforation except 14% of the group with 6W40Hz. 71% of the group with 6W40Hz, 25% of the group with 6W50Hz, 8% of the group with 12W40Hz, 0% of the group with 15W40Hz and 10% of the group with 18W40Hz had developed an ulcer.

CONCLUSIONS: While EVLA using a continuous wave laser results in perforation in most cases, EVLA using a pulsed wave laser doesn't lead to perforation even at a high energy setting.

3:15 pm – 3:45 pm **Coffee Break**

3:45 pm – 5:45 pm

SCIENTIFIC SESSION 2
Imaging and Other Topics

Moderators: Seshadri Raju, MD
Nicos Labropoulos, PhD

Educational Objectives: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Understand the use of venous endovascular simulation in the central veins; 2) Identify patterns of iliac vein compression with CTV and MRV; 3) Learn about the use of different varicose veins questionnaires.

3:45 pm – 4:05 pm 6

Venous Endovascular Simulation Training—Initial Observations

M. A. Mattos¹, Y. Rits^{1,2}, J. R. Rubin^{1,2},
B. Baigorri², O. Brown¹

¹Wayne State University, Detroit, MI, ²Detroit
Medical Center/Wayne State University,
Detroit, MI

WEDNESDAY

OBJECTIVES: Endovascular simulation training has been advocated as a method to improve the endovascular skills of interventional trainees but only procedures involving arteries have been reported. We describe our experience in venous endovascular simulation training for performance of diagnostic venography and inferior vena cava (IVC) filter placement.

METHODS: Endovascular simulation performance data on 4 vascular surgery fellows and one radiology resident were evaluated over a 14-month period. Simulated diagnostic and therapeutic procedures were performed in the IVC and renal veins using a VIST endovascular simulator (Mentice Inc., Gotenburg, Sweden). All procedures were proctored by a faculty observer with immediate formative feedback. Internal (simulator based) and external (physician developed) metrics were measured and obtained. Paired Student's t-test was used to compare combined initial (procedure 1) vs. final (procedure 20) performances. A post-performance questionnaire was completed by all of the trainees.

RESULTS: 100 simulated endovascular venous procedures were performed. Each trainee performed 20 nonselective cavagrams, 20 selective bilateral renal vein venograms, and 20 IVC filter placements. The table below lists the values \pm SD for procedures 1 and 20. Compared to their clinical experience a greater number of simulated diagnostic venous procedures and IVC filter placements were performed (100 vs. 25, $p < 0.001$). Time to completion for simulated nonselective cavagram, selective bilateral renal vein venography and IVC filter placement decreased significantly from procedure 1 to 20 ($p < 0.05$). By procedure 20 total procedure and fluoroscopy times had been reduced by more than 50% ($p < 0.006$ and $p = 0.07$). Combined wire, catheter, and fluoroscopic errors were significantly reduced by the final procedure ($p < 0.04$).

Procedural checklist (quantitative assessment) and global rating scale scores (qualitative assessment) were increased significantly by procedure 20 ($p < 0.005$) (instructional effectiveness). Questionnaire feedback indicated that venous endovascular simulator training coupled with immediate formative feedback improved endovascular skill sets and should be incorporated into fellow and resident training. The simulation program was reported as being useful for acquiring both basic and advanced endovascular skills in the venous system.

Variable	Procedure 1	Procedure 20
Total Procedure Time (sec)	2195 \pm 455	1066 \pm 270
Total Fluoroscopy Time (sec)	948 \pm 435	477 \pm 82
IVC cavagram (sec)	487 \pm 166	187 \pm 66
Bilateral renal vein venography (sec)	1265 \pm 571	450 \pm 162
IVC filter placement (sec)	2029 \pm 487	989 \pm 273
Combined Errors (#)	8 \pm 4	1 \pm 2
IVC Filter movement (mm)	17 \pm 15	7 \pm 12
Procedural Checklist Score (max 42)	23 \pm 5	41 \pm 5
Global Rating Scale Score (max 95)	41 \pm 5	87 \pm 14

CONCLUSIONS: Initial observations indicate endovascular simulation training improved the skill sets of vascular surgery and radiology trainees performing specific simulated venous procedures (diagnostic venography and IVC filter placement). Endovascular simulation training in the venous system offers an effective method in which to enhance skills training in catheter-based techniques.

4:05 pm – 4:25 pm 7 **Left Common Iliac Vein Compression Is Not Uncommon CT Finding**

M. Nazzal, M. Elfedaly, W. Qu, V. Kazan,
J. Abbas, G. Zelenock

University of Toledo Medical Center, Toledo, OH

BACKGROUND: Left Common Iliac compression (LCIVC) is a known clinical entity that can be associated with venous thrombosis. The incidence of LCIVC is variable based on the methods of evaluation. In the current study we evaluated the incidence of LCIVC based on CT scans done in a university hospital and correlated the presence of compression with clinical findings.

METHODS: All CT scan done were reviewed for the presence of LCIVC. The diameter of the left CIV at the point of crossing with the right common iliac artery was measured and compared to the diameter of the right CIV at the same level and to that of the left CIV distal to the point of compression. Stenosis of the left CIV at the point of crossing was calculated. The computer medical records of all patients were reviewed. Data was entered on an excel sheet. SPSS version 19 was used for analysis.

RESULTS: A total of 495 CT scans were reviewed. Only 300 patients had full medical records and CT scans involving the abdomen and pelvis. The average age is 51.9 years, 174 (58%) were females. 32 (10.7%) had swelling in left leg. 119 (39.7%) patients were overweight with 29.3% had BMI more than 30. Leg swelling was increased in patients with BMI ≥ 40 and history of DVT but not associated with the presence of LCIVC. Diameters of IVC, RCIV, and distal LCIV decreases with age in contrast to the diameter of the LCIV at crossing which increases with age. The diameter iliac veins and IVC are smaller in females than males, (Table 1). The diameter of the left CIV at the compression site shows a stenosis of 43.1% and 38.2% when compared to the distal left CIV and right CIV, respectively. The incidence of different degrees of LCIV stenosis as compared the distal LCIV and RCIV in males and females summarized in Table 2.

Table 1

Diameter (mm)	All Patients	Males	Females	P
LCIV crossing	7.5	8.6	6.6	0.0001
LCIV distal	13.6	13.8	13.4	N.S
R CIV	12.1	12.9	11.6	0.0001
IVC	15.3	16.6	14.4	0.0001

WEDNESDAY

Table 2				
Site Stenosis	Overall	Males (M)	Females (F)	P Value (M vs F)
vs. distal L CIV	43.1%	36.6%	48.5%	0.0001
>90%	12 (4%)	2 (1.6%)	10 (5.7%)	NS
>70%	59 (19.7%)	14 (11.1%)	45 (25.9%)	0.002
>50%	134 (44.7%)	42 (33.3%)	92 (52.9%)	0.001
vs. R CIV	38.2%	32.1%	42.7%	0.003
>90%	5 (1.7%)	1 (0.8%)	2 (2.3%)	NS
>70%	48 (16%)	14 (19.5%)	34 (19.5%)	0.049
>50%	110 (36.7%)	37 (29.4%)	72 (42%)	0.026

CONCLUSION: LCIVC is a common CT finding. Generally it is more frequent in females at different degrees of stenosis. LCIVC decreases with age. Swelling of the left leg is not related to the presence of LCIVC or to the degree of stenosis. Swelling is associated with morbid obesity and history of DVT, Table 1.

4:25 pm – 4:45 pm 8

Responsiveness of Individual Questions from the Venous Clinical Severity Score and the Aberdeen Varicose Vein Questionnaire

C. R. Lattimer, E. Kalodiki, M. Azzam, G. Geroulakos

Ealing Hospital & Imperial College, London, United Kingdom

WEDNESDAY

BACKGROUND: The Venous Clinical Severity Score (VCSS) and the Aberdeen Varicose Vein Questionnaire (AVVQ) are both dynamic assessment tools which measure the effects of venous treatment in patients with Superficial Venous Insufficiency (SVI). The total scores universally improve after treatment but it is unclear which questions are the most responsive to change and which questions remain relatively static. The aim of this study was to evaluate the change in each question following treatment at 3 weeks and 3 months.

METHODS: This is a retrospective study on a database of 100 patients (M:F = 41:59) with SVI ($C_2 = 34$, $C_3 = 14$, $C_{4a} = 29$, $C_{4b} = 9$, $C_5 = 7$, $C_6 = 7$) who received treatment with endovenous laser ablation ($n = 50$) or foam sclerotherapy ($n = 50$). The change scores of each question of the VCSS (questions 1–10) and the AVVQ (questions 1–13) were calculated by subtracting the score at 3 weeks, and 3 months, from the pre-treatment score. Significant changes ($P < .05$) were highlighted using the Wilcoxon test. A subgroup analysis was also performed ($n = 92$) on treatment type. Patients were also stratified at 3 months using complete abolition of saphenous reflux with normalization of the Venous Filling Index (VFI < 2.5 ml/sec) on air plethysmography ($n = 38$, Group A) versus any remaining haemodynamic impairment on duplex or VFI ($n = 54$, Group B).

RESULTS: Both the median (IQR) VCSS and the AVVQ scores significantly improved. From 6 (4) and 21.4 (15.1) at baseline to 3 (4) and 18.6 (12.1) at 3 weeks ($P < .0005$, $P = 0.031$) and to 2 (3) and 8.8 (13.6) respectively at 3 months, ($P < .0005$, $P < .0005$). The first 3 questions of the VCSS (pain, extent of varicosities, edema) responded most to the effects of treatment, in all categories, Table 1. Questions 5, 6, 7, 9 on inflammation and active ulceration all improved individually but responded least overall due to statistical dilution (7/100 patients). The majority of the AVVQ questions on quality of life significantly improved, Table 2. However, VCSS Q.10 and AVVQ Q.5 were not useful (negative change) because stocking application was recommended early post-treatment identifying greater severity.

Table 1. Individual VCSS Questions and the Significance of Their Change. *Deterioration

VCSS	P > .05	P < .05 & P > .0005	P < .0005
Total 3 weeks	5,6	7,8,9,10*	1,2,3,4
Total 3 months	6,7,9	4,5,8,10	1,2,3
Laser 3 weeks	5,6,7,8,9	4	1,2,3,10*
Foam 3 weeks	5,6,7,8,9,10	4	1,2,3
Laser 3 months	5,6,7,8,9,10	4	1,2,3
Foam 3 months	4,5,6,7,8,9	10	1,2,3
Group A	4,5,6,7,8,9,10	.	1,2,3
Group B	5,6,7,8,9	10,4	1,2,3

Table 2: Individual AVVQ Questions and the Significance of Their Change. *Deterioration

AVVQ	P > .05	P < .05 & P > .0005	P < .0005
Total 3 weeks	9,12,13	2,3,6,11	1,4,5*,7,8,10
Total 3 months	5,9	3	1,2,4,6,7,8,10,11,12,13
Laser 3 weeks	2,9,12,13	4,6,8,11	1,3,5*,7,10
Foam 3 weeks	3,6,9,11,13	2,7,8,10,12	1,4,5*
Laser 3 months	3,5	8,9,11,12	1,2,4,6,7,10,13
Foam 3 months	3,5,9	6,7,8	1,2,10,11,12,13
Group A	3,5,9	7,8	1,2,4,6,10,11,12,13
Group B	5,9	3,7,8,12	1,2,4,6,10,11,13

CONCLUSIONS: The individual questions of the VCSS and AVVQ are significantly responsive to change following treatment at 3 weeks and 3 months. However, questions 6,7,9 of the VCSS and 5,9 of the AVVQ (stocking use, ulceration) failed to respond overall after 3 months. These results may be of importance in deciding on future revisions of these dynamic assessment tools.

4:45 pm – 5:05 pm 9

ECG-Gated Dynamic Magnetic Resonance Is the Preferred Imaging Modality for May-Thurner Syndrome

C. A. Duran¹, L. Abboud², A. B. Lumsden¹, D. Shah², J. Bismuth¹

¹The Methodist DeBakey Heart and Vascular Institute, Houston, TX, ²The Methodist Hospital, Houston, TX

WEDNESDAY

BACKGROUND: May-Thurners syndrome occurs secondary to chronic extrinsic compression of the left common iliac vein by the overlying right common iliac artery. Patients with symptoms consistent with this disease merit further evaluation and treatment. Several options exist for noninvasive diagnostic imaging. Ultrasound allows for rapid visualization of the lower extremity vessels and is highly sensitive for detecting obstruction and reflux, however it is a poor choice for visualizing the iliac vessels. CTA can identify extrinsic sources of compression that is static but is limited in its ability to identify dynamic compression that occurs only during a portion of the cardiac cycle. Dynamic MR allows for noninvasive imaging of the pelvic vasculature and surrounding structures with the ability to identify changes that occur throughout the cardiac cycle. Here we present a series of 6 patients with suspected May-Thurners who underwent dynamic MR.

METHODS: MR was performed using a 1.5-T or 3.0-T scanner (Magnetom Verio, Siemens Medical Solutions, Erlangen, Germany). Morphologic images were obtained using ECG-gated bright blood steady state free precession (6.0 mm slice) in axial, coronal and sagittal planes. ECG-gated SSFP cine images (5.0 mm slice) were obtained in the axial plane at the level of the aorto-iliac bifurcation (20–25 frames per cardiac cycle). High-resolution 3D MR angiography (1.3 mm slice) was obtained in the coronal plane during the administration of gadolinium-based contrast to obtain arterial and venous phase images. ECG-gated, phase contrast images were acquired to assess flow acceleration. After contrast administration, 2 additional steady state sequences are obtained; direct thrombus imaging sequence, and a post-contrast 3D gradient echo T1-weighted sequence in which images comparable to CT are used to identify extrinsic compression, post-stenotic dilation, or superficial venous engorgement.

RESULTS: Six patients presenting with symptoms of May-Thurners and LLE venous reflux and varicocities by duplex U/S were evaluated with MR. Criteria for diagnosis included: extrinsic compression or post-stenotic dilation, and demonstration of flow acceleration during systole. 3/6 had evidence of May-Thurners by MR. Four patients (3 with +MR, one negative study but strong clinical suspicion), were evaluated with venography and IVUS, confirming the diagnosis in all 3 patients with +MR. One patient with a negative MR had venous stenosis with luminal disease confirmed by IVUS, without evidence of extrinsic compression by multiview venography.

CONCLUSION: Dynamic MR can diagnose May-Thurners by different available sequences, and because these sequences are ECG-gated, can demonstrate flow acceleration during systole, offering an important advantage over CT, which only provides anatomical images. Limitation of MR is demonstrated in the case where luminal disease was not identifiable.

5:05 pm – 5:25 pm 10

Prospective Comparison of Iliac Vein Compression Using Computed Tomography

R. J. Meisner, M. Gavalas, A. Tassiopoulos,
A. Gasparis, N. Labropoulos

Stonybrook University Hospital, Stony Brook, NY

INTRODUCTION: The anatomic course of the iliac veins as they travel through pelvis has been implicated in venous disease. The true role in contributing to venous disease is not exactly known but has gained more attention as advanced imaging and endovascular tools are more available to vascular physicians.

METHODS: A prospective study of 30 consecutive asymptomatic patients and 30 advanced venous disease patients were evaluated for proximal vein compression. Contrast enhanced computerized tomography (CT) was used to survey the common iliac veins through the pelvis as they interact with the iliac arteries and the L5 vertebral body. Cross-sectional area of the maximally compressed and uncompressed iliac veins was calculated using the major and minor diameters of the vessel. Additional sites of external compression of the caudal iliac veins at multiple levels were observed.

RESULTS: The mean area reduction of the iliac veins were $36.65\% \pm 20.23\%$ for advanced venous disease patients, and $31.75\% \pm 23.65\%$ for asymptomatic control patients. This difference was not statistically significant with a p-value of 0.325 (Mann-Whitney U Test). In the advanced venous disease patients, an area reduction of >25%, 50%, and 70% was seen in 11, 7, and 2 patients, respectively. Equivalent area reductions were seen in 8, 7, and 1 asymptomatic control patient, respectively. In both groups there were multiple sites of “alternative” compression or non-May-Thurner compression found. In 18 patients (30%) we found this type of alternative compression with the right common iliac vein being compressed by the right common iliac artery (n = 6) and the right common iliac vein being compressed by the right internal iliac artery (n = 6) as the most common.

DISCUSSION: Despite the implicated role of extrinsic compression of the iliac veins in venous disease, we did not find statistically significant area reductions of the iliac veins in advanced venous disease patients as compared with asymptomatic controls. Computed tomography, as a method to systematically quantify iliac vein compression has limitations. Even using multiplanar reconstructions, measurement of the area of the iliac veins can be difficult as the course of the vein is often not directly in the plane of the image.

It was noted that 30% of patients displayed “alternative” or non-May-Thurner compression in their iliac vessels. The role of this alternative compression in advanced venous disease patients is currently unknown.

WEDNESDAY

5:25 pm – 5:45 pm 11 **Effect of Body Mass Index on Lower
Extremity Duplex Ultrasonography**

J. Heller

Johns Hopkins, Baltimore, MD

BACKGROUND: Duplex ultrasonography has long been considered the gold standard diagnostic modality for evaluation of lower extremity acute deep venous thrombosis. (DVT) Multiple known advantages include its noninvasiveness, high sensitivity and specificity rates, and accuracy. However, certain clinical circumstances can negatively impact the findings of a duplex examination, such as body habitus. The purpose of this study was to determine if there was a body mass index (BMI) cutoff at which duplex ultrasonography was not an appropriate first test to rule out a DVT.

METHODS: Sequential retrospective analysis was performed on all patients who underwent a lower extremity DVT examination in a single ICAVL center.

RESULTS: 496 patients were entered into the study for analysis. Gender, age, BMI, and final impressions of the lower extremity venous duplex were entered into the database for analysis. Patients were categorized by BMI: patient subgroups were divided in groups of BMIs of ranges of 10 points. There was a direct correlation between increasing BMI and increasing proportion of inconclusive findings on examination. <20: 17%, 20–25: 12%, >25–30: 9%, >30–40: 14%, >40–50: 26%, >50–60: 37%, >60–70: 86%, and >70: 50%. Using the chi-squared test, these findings are significant $p < .0001$.

CONCLUSIONS: Elevated BMI does carry with it an increased likelihood of equivocal findings on duplex examination. These results suggest that patients with BMI > 40 should consider undergoing an alternative diagnostic imaging modality.

6:00 pm – 7:30 pm

WELCOME RECEPTION

In Exhibit Hall

Thursday, February 9, 2012

7:00 am – 8:00 am Continental Breakfast/Exhibits Open

8:00 am – 10:00 am **SCIENTIFIC SESSION 3**
Deep Vein Thrombosis I

Moderators: Peter Henke, MD
Susan Kahn, MD

Educational Objectives: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Be able to define risk factors and scoring system associated with VTE in selected surgical patients; 2) To define patient characteristics associated with IVC filter complications and techniques to avoid these complications; 3) To describe the role of inflammation and its inhibition by statin agents in experimental DVT; 4) List factors and preventative measures to decrease VTE after arterial reconstructive procedures.

8:00 am – 8:20 am 12 **Predicting 60-Day Venous Thromboembolism Risk in Plastic and Reconstructive Surgery Patients: A Comparison of the 2005 and 2010 Caprini Risk Assessment Models**

P. R. Portschi¹, C. J. Pannucci², J. Barta¹,
G. Dreszer¹, R. E. Hoxworth³, L. K. Kalliainen¹,
E. G. Wilkins²

¹University of Minnesota, Minneapolis, MN,

²University of Michigan, Ann Arbor, MI,

³University of Texas Southwestern, Dallas, TX

BACKGROUND: The Caprini risk assessment model (RAM) is a weighted risk stratification tool used to predict 30-day or 60-day venous thromboembolism (VTE) risk. Compared to the 2005 model, the 2010 model has more sub-categories and an additional risk factor. The 2010 RAM has not been formally validated and the changes may alter a patient's Caprini score and/or the model's ability to predict VTE risk. The Venous Thromboembolism Prevention Study (VTEPS) is a multi-center surgery study examining peri-operative VTE risk factors and 60-day VTE outcomes in plastic surgery patients. The study's objective was to compare scores derived from the 2005 and 2010 Caprini RAM and examine their ability to predict 60-day VTE risk.

METHODS: The VTEPS is a multicenter study previously described in detail. The study utilized the 2005 Caprini RAM and assessed the incidence of symptomatic VTE. We performed a matched observational cohort study using the existing

THURSDAY

VTEPS database. Caprini scores using the 2005 and 2010 models were calculated and compared. Group differences in 2005 and 2010 Caprini scores were examined using the Wilcoxon Signed Rank test. Descriptive statistics that examined VTE incidence by stratified risk score were generated. Differences in observed VTE rate, by stratified risk score, were examined using Pearson's chi-square test.

RESULTS: When compared to 2005 Caprini scores, 2010 scores were lower in 17.6% of patients, unchanged in 23.3%, and higher in 59.2% (Figure 1). The 2010 Caprini scores increased the number of patients stratified as “super-high” risk by three-fold.

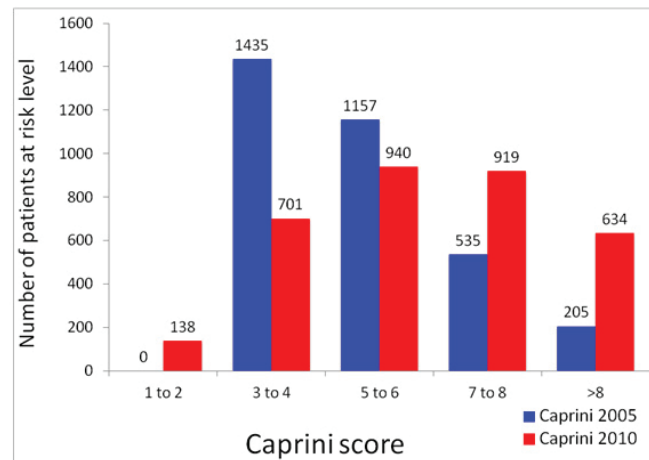


Figure 1: Differences between the 2005 and 2010 versions of the Caprini Risk Assessment Models

Patients classified as “super-high” risk (Caprini score >8) using the 2005 Caprini RAM were significantly more likely to have a 60-day VTE event when compared to patients classified as “super-high” risk using the 2010 guidelines (5.85% vs. 2.52%, $p = 0.021$). There were no significant differences in observed 60-day VTE rate at any other risk level (Figure 2).

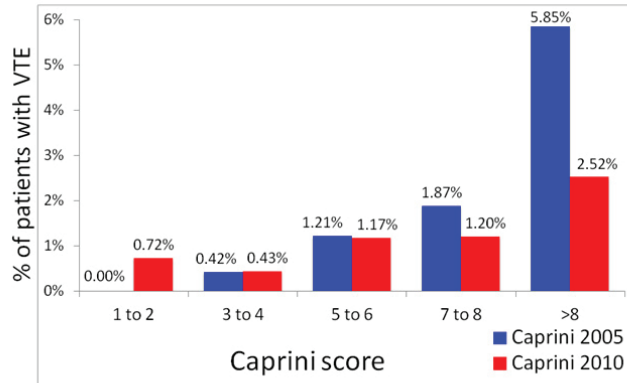


Figure 2: Comparison of observed VTE rates at stratified risk levels between the 2005 and 2010 Caprini Risk Assessment Models.

CONCLUSIONS: The 2005 version of the Caprini RAM is a validated risk prediction tool for 60-day VTE events in adult plastic surgery patients who require post-operative admission. We recommend that the 2005 Caprini RAM be used to risk-stratify plastic surgery patients and guide prophylaxis decisions. The 2010 Caprini RAM contains data-driven changes that may contribute to improved risk stratification. However, the model requires formal validation with appropriate determination of new risk levels prior to widespread adoption.

THURSDAY

8:20 am – 8:40 am 13 **Non-Lipid-Lowering Effects of Rosuvastatin on Venous Thrombosis in a Mouse Model of DVT**

E. DeRoo, S. K. Wroblewski, A. E. Hawley,
N. E. Ballard-Lipka, L. Brentin, D. D. Myers,
T. W. Wakefield, J. A. Diaz
University of Michigan, Ann Arbor, MI

BACKGROUND: Inflammation is important throughout all stages of deep vein thrombosis (DVT), especially in the onset of acute thrombogenesis. Fibrinolysis, which is regulated by PAI-1, is essential for thrombus resolution. Statins have been shown to possess pleiotropic properties that affect both inflammation and the fibrinolytic system, independent of lowering lipids effect. In the JUPITER trial, DVT was significantly decreased in non-hyperlipidemic patients treated with rosuvastatin. However, the mechanism behind this effect on DVT remains unclear. Here we investigated the anti-inflammatory and pro-fibrinolytic properties of rosuvastatin using a mouse model of DVT.

METHOD: Inferior vena cava (IVC) ligation was performed to create a DVT in C57BL/6 mice. This mouse strain is non-inflammatory by nature. Groups included: rosuvastatin treated (5 mg/kg) and saline controls, starting 2 days before surgery. IVCs and liver were harvested and blood samples collected at very early time points (acute DVT) 3 hr, 6 hr and 2 days after surgery. The IVC and its thrombus were evaluated for thrombus weight and plasma samples for PAI-activity. In addition, gene expression of PAI-1 and inflammatory markers (IL-6, CCL2, CRP, IL-1b, TNF α) were measured in vein wall (local effect) and liver (systemic effect).

RESULTS: (Table 1) Thrombus weight was significantly decreased at day 2 post DVT in rosuvastatin mice, compared to controls, Vein wall PAI-1 gene expression was significantly decreased at 3hr. Also, circulating active PAI-1 was significantly decreased at 6hr post DVT. IL-6 and CCL2 were significantly decreased in vein wall at 3hr. Systemic IL-6, CRP and TNF α were all significantly decreased at 6 hours.

Table 1: Rosuvastatin treated mice compared to controls results.

	Thrombus Weight	PAI-1 Circulating	PAI-1	IL-6	CCL2	CRP	IL-1 β	TNF α
3H	NS	NS	R: 0.07 \pm 0.01 C: 0.14 \pm 0.01 (p<0.05) ↓ Vein Wall	R: 0.37 \pm 0.05 C: 1.98 \pm 0.30 (p<0.05) ↓ Vein Wall	R: 0.45 \pm 0.10 C: 1.66 \pm 0.38 (p<0.05) ↓ Vein Wall	Trend but NS ↓ Vein Wall	Trend but NS ↓ Vein Wall	NS
6H	NS	R: 5981 \pm 379 C: 28540 \pm 7461 (p<0.05) ↓ Plasma	NS	R: 0.011 \pm 0.002 C: 0.111 \pm 0.026 (p<0.05) ↓ Liver	Trend but NS ↓ Liver	R: 35.44 \pm 21.03 C: 380.6 \pm 22.85 (p<0.05) ↓ Liver	NS	R: 0.0015 \pm 0.0004 C: 0.0219 \pm 0.0042 (p<0.05) ↓ Liver
2D	R: 0.025 \pm 0.001 C: 0.033 \pm 0.001 (p<0.05) ↓	NS	NS	NS	NS	NS	NS	NS

CONCLUSIONS: Rosuvastatin decreased inflammatory markers and PAI-1 in this mouse model of DVT. An anti-inflammatory effect from rosuvastatin was observed in the vein wall at 3 hr, while a systemic effect was documented at 6hr post thrombosis. A reduction in PAI-1 was observed both locally and systemically only in the rosuvastatin treated animals. These early anti-inflammatory and pro-fibrinolytic effects, due to the administration of rosuvastatin, significantly decreased thrombus weight 2 days post-IVC ligation, and suggest a potential mechanism for rosuvastatin's effect on DVT in the JUPITER trial.

THURSDAY

8:40 am – 9:00 am 14 **Reporting the Impact of Inferior Vena Cava Perforation by Filters**

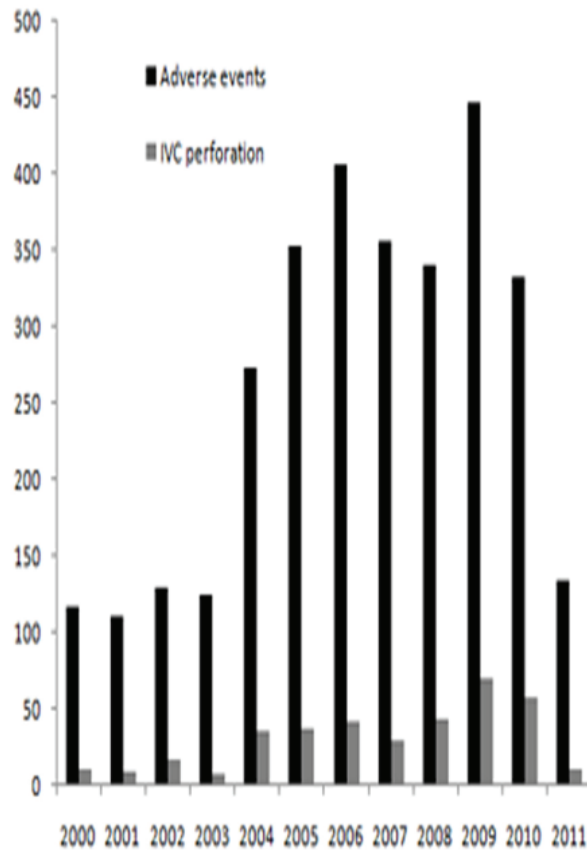
E. A. Wood, R. D. Malgor, A. P. Gasparis,
N. Labropoulos

Stony Brook University Medical Center, Stony Brook, NY

BACKGROUND: Perforation of the inferior vena cava (IVC) and its surrounding structures by filter struts is a known complication. The goal of our review is to gauge the impact of IVC perforation by filters based on a 'real world' open database provided by users, facilities and manufacturers.

METHODS: We reviewed 3,123 adverse events of IVC filters reported in the Food and Drug Administration MAUDE (Manufacturer and User Facility Device Experience) database from January 2000 to June 2011. Outcomes of interest were incidence of IVC perforation, type of filter, clinical presentation, and management of the perforation, including retrievability rates.

RESULTS: Three hundred sixty-seven cases of IVC perforation (12%) were reported. The annual distribution of IVC perforation was 32 (11%) cases, varying from 7 (6%) to 70 (17%). A three-fold increase in the number of adverse events related to IVC filters has been noted since 2004; however, the accrual numbers of IVC perforation have not significantly changed over the years (Graph 1). The most common IVC filter involved in IVC perforation was the Bard G2 Filter Platform System (225, 61%), followed by the Cook Celest in 38 cases (10%). Vein wall perforation as an incidental finding was the most common presentation described in 171 (47%) patients. Surrounding organ involvement was found in 121 (33%) cases, with the aorta involved in 40 (33%) and the duodenum in 26 (21%) cases. The filter retrieval rate was 84% regardless of vein wall perforation. Forty (11%) cases required an open procedure to remove the filter due to either multi-organ involvement or a failed attempt at retrieval. Neither major bleeding requiring further intervention nor mortality was reported secondary to filter retrieval.



THURSDAY

CONCLUSIONS: IVC perforations by filters remain stable over the past decade despite increasing numbers of adverse events reported. The majority of filters involved in perforation were retrievable and had a multi-prong design for better attachment to the vein wall. Endovascular filter retrieval, regardless of IVC wall perforation, is feasible and must be attempted as it is associated with a higher success rate, and no mortality or major bleeding events have been reported.

9:00 am – 9:20 am 15 **Factors Increasing Risk of Venous Thromboembolism After Arterial Reconstructive Procedures**

L. Mureebe, M. Ghandi, C. K. Shortell

Duke University Medical Center, Durham, NC

BACKGROUND: Although the incidence of venous thromboembolic events (VTE) after common vascular surgical procedures repair is low, we hypothesize that the risk of VTE may be higher in an identifiable subset of patients. These patients may benefit from appropriate measures to prevent VTE. To date, no study has examined and/or elucidated this issue.

METHODS: The National Inpatient Survey (NIS) database from years 2000–2009 was reviewed. Records of patients who underwent open repair of an intact abdominal aortic aneurysm (AAA), carotid endarterectomy (CEA) aortobifemoral bypass for occlusive disease (ABF) and infrainguinal bypass (BPG) were crossed with appropriate diagnoses for those operations. The outcome variable evaluated was the development of VTE (deep vein thrombosis (DVT) or pulmonary embolism (PE)) as specified by the International Classification of Diseases, 9th revision (ICD-9; DVT 453.4 and PE acute and postoperative 415.19 and 415.11, respectively). Perioperative and hospital complications were grouped into five families (intestinal, pulmonary, urinary, infectious and cardiac). Prior patient histories of VTE and a history of coagulopathy were also examined. Multivariate analysis of common complications and the association of these complications with the frequency of VTE were conducted. Chi-squared statistics were calculated. For all analyses, $p < .05$ was considered significant.

RESULTS: The total number of discharges containing one of the procedures of interest was 750,659. Table 1 details the number of discharges and the incidence of VTE for each of the procedures. All the complications we assessed, except for cardiac, were more associated with patients who developed VTE. For all procedures, the combined endpoint of VTE was more statistically more likely in patients with pulmonary, urinary, infectious complications or had a history of VTE or a history of coagulopathy. For all procedures, cardiac complication did not show an association with the development of VTE. Intestinal complications were associated with VTE development in patients undergoing AAA or fem-distal bypasses, but not CEA or ABF.

Table 1: Frequency of Procedures and Percentage with VTE

Diagnosis	n	%VTE
AAA	73,545	0.34
CEA	373,465	0.06
ABF	50,415	0..27
BPG	253,234	0.31

CONCLUSIONS: The overall rate of VTE in patients undergoing common vascular surgical procedures is quite low. We have a difference in VTE risk based on complications that occur during the hospital stay. The observation of the low incidence of VTE in patients with cardiac complications may be due to anticoagulation of patients with cardiac complications. This data suggests we should consider anticoagulation in patients with multiple perioperative complications.

THURSDAY

9:20 am – 9:40 am 16 **Strategy of Thrombus Removal for Extensive DVT of Pregnancy**

S. Herrera, S. Thakur, S. Sunderji, R. DiSalle,
S. N. Kazanjian, Z. Assi, A. J. Comerota
The Toledo Hospital, Toledo, OH

BACKGROUND: Extensive deep vein thrombosis (DVT) is associated with severe postthrombotic morbidity when treated with anticoagulation alone. Extensive DVT during pregnancy is usually treated with anticoagulation alone, risking significant postthrombotic morbidity. Thrombolytic therapy and operative venous thrombectomy have been safely and effectively used in selected pregnant patients. The purpose of this report is to review the short and long-term outcomes of eleven patients with extensive DVT of pregnancy treated with a strategy of thrombus removal.

METHODS: From 1999–2011, eleven patients were referred for management of extensive DVT during pregnancy, ten patients with iliofemoral/caval DVT and one with acute superior vena caval syndrome. Gestational age ranged from 8 to 36 weeks. All patients were offered a strategy of thrombus removal including catheter-directed thrombolysis, pharmacomechanical thrombolysis (PMT), and/or operative venous thrombectomy. Fetal monitoring was performed throughout hospitalization. Radiation exposure was minimized by using pelvic lead shields, limiting fluoroscopy, using small visual fields, hand held contrast injections and avoiding magnified views. Following intervention, leg compression was applied, patients were anticoagulated with heparin and ambulated. Patients were converted to vitamin K antagonists after delivery. Follow up included objective evaluation using venous duplex and the Villalta scale.

RESULTS: Catheter-directed thrombolysis and PMT were used in nine patients. Two patients declined thrombolytic therapy but agreed to venous thrombectomy, and one patient had operative thrombectomy as an adjunct to PMT. Each patient had complete or near complete thrombus resolution and rapid improvement in clinical symptoms. Eight patients delivered healthy infants at term; two are currently in their third trimester, one suffered an in-utero death 5 days post lysis due to her antiphospholipid antibody syndrome. One patient developed two major complications, gross hematuria requiring blood transfusion and a left popliteal artery pseudoaneurysm that resolved with compression ultrasound. Mean follow up was 2 years, without evidence of recurrence. Three patients had uneventful subsequent pregnancies. Venous duplex ultrasonography demonstrated patent veins and normal valve function in 8 patients. Of the 10 patients with iliofemoral DVT, 9 had Villalta scores < 4, and one patient had a score of 5, consistent with mild postthrombotic syndrome.

CONCLUSIONS: Extensive DVT of pregnancy can be effectively and safely treated with a strategy of thrombus removal, resulting in a patent venous system with normal valve function, prevention of postthrombotic morbidity, and reduction in recurrence. Operative and catheter-based techniques can be tailored to the patient.

9:40 am – 9:45 am **QS-6 Percutaneous Femoral Vein Access for Inferior Vena Cava Filter Placement Does Not Cause Insertion Site Thrombosis: A Prospective Study**

B. D. Lambe¹, J. J. Bedway², M. L. Friedell²

¹University of Central Florida College of Medicine, Orlando, FL, ²Orlando Health, Orlando, FL

BACKGROUND: The efficacy of inferior vena cava filters in the prevention of pulmonary embolism in patients with lower extremity deep venous thrombosis (DVT) has been well-described. What remains uncertain is the risk of insertion-site thrombus in the femoral vein after filter placement. Historically, the risk was relatively high, most likely due to large delivery systems and therefore a need for longer compression at the insertion site to provide hemostasis. The goal of this study was to determine the incidence of clot formation at the femoral vein puncture site following the percutaneous insertion of contemporary inferior vena cava (IVC) filters.

METHODS: From October, 2010 to August, 2011 fifty-two consecutive patients underwent placement of an IVC filter by three vascular surgeons and four interventional radiologists at our tertiary care Level I trauma center. Duplex ultrasound studies were performed within 24 hours before filter placement and 24 to 48 hours after filter placement.

RESULTS: The patients—44 men and eight women—ranged in age from 19 to over 90. The filters placed were: Boston-Scientific—Greenfield (27), Cook-Celect (13), Bard—G2X (2), Bard—Eclipse (5) and the Cordis—TrapEase (5). Sheath diameters ranged from six to twelve French. Most filters were placed for prophylactic reasons: paraplegia/quadriplegia (14), major trauma with immobility (18), severe closed head injury (2), malignancy (2). The rest were placed because of an acute DVT with a contraindication to or a complication from anticoagulation (16). Nine patients had an underlying malignancy, and one had a factor V Leiden deficiency. None of the 52 patients in this study showed clot formation at the insertion site.

CONCLUSIONS: Based upon this prospective study, the risk of femoral insertion site thrombosis following percutaneous IVC filter placement is negligible. We speculate that this is most likely due to the smaller delivery systems used today. Concern for femoral vein thrombosis should no longer be a reason for using internal jugular vein access for IVC filter placement.

THURSDAY

9:45 am – 9:50 am **QS-7 Internal Jugular Approach for CTD
During Treatment of IFDVT Causes No
Mechanical Damage and No Venous
Valvular Incompetence**

J. L. Martnez-Trabal, M. Rivera-Rodriguez,
R. Figueroa Vicenty, L. Torruella
Caribbean Vascular Center, Ponce, PR

BACKGROUND: It is recognized by expert consensus guidelines that proximal DVT should be treated with catheter directed thrombolysis to avoid the postphlebotic syndrome that will be present when treated with anticoagulation alone. The most common approach for venous access described in literature is the ipsilateral popliteal vein using ultra sound guidance. Our preferred approach is rarely used by others and not yet described in literature. This approach is avoided due to the prescence of valves in the lower extremity venous system, that makes it technically challenging and there is the potential risk of mechanical damage to the valves. Our purpose is to evaluate the results and usefulness of CDT for the treatment of proximal DVT using the internal jugular vein approach and demonstrate that if there is mechanical damage it will not lead to valvular incompetence.

METHODS: All patients treated with CDT at a university hospital were placed in a registry. Data that was collected and analyzed, and included demographics, thrombus burden and location, days since onset of symptoms, catheter entry site, hospital length of stay (LOS), ICU LOS, treatment time, r-TPA dose, the use of adjuncts, etiology, thrombus resolution and complications.

RESULTS: A total of twenty five patients were evaluated, 14 females and 11 males. With average age of 45. All patients had DVT in the Illofemoral vein and 5 had IVC involvement. Approach through internal jugular vein in most patients, with only 7 patients using the ipsilateral popliteal vein. Thrombus resolution average 95%. Follow up duplex showed evidence of valvular insufficiency in 4 patients, with 33% of patients having acute on chronic DVT at the time of completion venography. Complications included >15% drop in hemoglobin in near 60% of patients, one patient with IVC filter embolization, one with popliteal fossa hematoma, one with pulmonary failure, one with hemothorax and one who developed HIT with thromboses.

CONCLUSIONS: Catheter directed thrombolysis continues to provide a safe and effective strategy for prompt thrombus removal and avoids postphlebotic morbidity. The results of CDT using the internal jugular approach are very similar, in terms of lytic success and complication rates when compared to other series. The observed presence of valvular insufficiency in follow up venous duplex studies is most likely related to chronic DVT and primary valvular incompetence when complete thrombus resolution is obtained. Mechanical injury to the venous valves secondary to the use of a retrograde approach through the internal jugular vein does not result in chronic valvular insufficiency. Jugular vein approach is safe, effective and our initial experience shows lack of significant mechanical damage to valves using a retrograde technique.

9:50 am – 9:55 am **QS-8 Midterm Outcomes of Endovascular Treatment for Iliofemoral Deep Venous Thrombosis (DVT)**

H. Khan^{1,2}, M. Gardner^{1,2}, Z. Kostun^{1,2},
H. Dosluoglu^{1,2}, L. Harris^{1,2}, A. Coulter^{1,2}

¹State University of New York at Buffalo, Buffalo, NY; ²VA Western New York Healthcare System, Buffalo, NY

BACKGROUND: Iliofemoral deep venous thrombosis (DVT) results in mortality and morbidity in both the short (pulmonary embolism—PE) and long term (post-thrombotic syndrome—PTS). The earliest treatment for iliofemoral DVT involved anticoagulation alone, and this was followed by a strategy of clot removal. Despite good early results with this approach, clot removal lost favor secondary to invasive nature and higher complication rate. With the advent of endovascular techniques and availability of lytic drugs, the clot removing approach combined with adjunctive endovascular therapy is gaining popularity. Conclusive evidence on the efficacy of this approach remains lacking. We hereby present our experience and midterm outcomes after endovascular treatment of iliofemoral DVT.

METHODS: All patients undergoing endovascular treatment for iliofemoral DVT over a five year period were identified. Charts were retrospectively reviewed for patient demographics, extent of venous involvement, procedure details and patency rates. Post-operative patency was routinely assessed using duplex ultrasonography. Primary and secondary patency rates were calculated at 12 months.

RESULTS: A total of 31 patients were included for analysis. Mean age was 55.1 ± 16.85 years and 50% of patients were male. Mean follow up was 13.0 ± 10.4 months. Overall primary and secondary patency on an intent to treat basis were $76 \pm 8\%$ and $84 \pm 7\%$ respectively at 12 months. Technical success was achieved in 81% of patients, and in these patients, primary and secondary patency at 12 months was $86 \pm 4\%$ and 100% respectively. Of the patients in whom technical success could not be achieved, 67% had chronic disease compared with 16% of patients in the group in which technical success was achieved. There was a single peri-operative death in a hospice patient with terminal cancer who underwent treatment for palliation of symptoms. There were no other peri-procedural complications.

CONCLUSIONS: Endovascular treatment of iliofemoral DVT is overall a safe and effective approach to management. It provides excellent midterm patency rates and in our series, we saw no peri-procedural complications. However, certain populations of patients may have limited benefit from endovascular therapy—in particular, patients with chronic DVT. Optimal patient selection is key to obtaining maximal benefit from endovascular interventions. Larger studies with increased number of patients and longer term follow up are required before making any conclusive recommendations.

THURSDAY

9:55 am – 10:10 am

ACP BEST PAPER

**Inelastic Compression in Mixed Ulcers
Increases Arterial Inflow and Venous
Output**

G. Mosti¹, H. Partsch¹

*¹MD Barbantini Hospital, Lucca, Italy, ²Private
practice, Wien, Italy*

10:10 am – 10:50 am

Coffee Break

10:50 am – 12:30 pm

SCIENTIFIC SESSION 4

Venous Potpourri

Moderators: Harold Welch, MD
Ashman Mansour, MD

Educational Objectives: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Understand the value of wearing compression stockings postoperatively after varicose vein surgery; 2) Be aware of the value and limitations of sapheno-popliteal bypass for chronic venous occlusion of the femoral or proximal popliteal vein; 3) Learn how treatment of CCSVI may improve symptoms of MS; 4) Gain knowledge of how a new prosthetic vein valve may improve treatment options for CVI; 5) Learn how stocking compression strength and surgery can affect ulcer healing; 6) Determine if GSV ablation affects perforator vein reflux and size.

10:50 am – 11:10 am 17

Value of Postoperative Compression After Surgical Treatment of Varicose Veins

P. Pittaluga, S. Chastanet
Riviera Veine Institut, Nice, France

THURSDAY

BACKGROUND: It is customary to recommend wearing of elastic band compression or compression stocking after treatment of varicose veins. We wanted to learn through this study the benefit of wearing elastic compression after surgical treatment of varicose veins (VVs).

METHODS: We have prospectively included all patients operated on for unilateral VVs, and distributing them into two groups:

Group 1: putting on a class 2 stocking (18 mmHg) from the operating day until the postoperative consultation (approximately 8 days afterwards).

Group 2: putting on a class 2 stocking (18 mmHg) from the operating day until the following day (D1) when it is removed.

RESULTS: One hundred patients were included in the study, in equal proportion (50) between group 1 and group 2. The study of the demographic, clinical and hemodynamic characteristics, show no significant difference between the two groups.

All the surgical procedures had been carried out under tumescent local anesthesia, in short ambulatory. The procedures carried out were not significantly different between group 1 and group 2, and had been most frequently phlebectomy with conservation of the refluxing saphenous vein (ASVAL) (46% vs. 48%).

The patients all returned to postoperative consultation (on average 10.0 days on average for group 1 and 9.4 days group 2, non-significant: NS) for evaluation. The average pain score (visual analog scale: VAS) was not significantly different between group 1 and group 2 (0.6 vs. 0.8).

The self-evaluation by VAS of the size of ecchymoses reported an average score without significant difference between groups 1 and 2 (1.3 vs. 1.2).

The circumference of the ankle measured was not significantly different between the operated limb and the contralateral limb, for group 1 (26.2 cm vs. 25.9 cm) as well as for group 2 (26.2 cm vs. 26.0 cm).

The measurement of the quality of life by the CIVIQ questionnaire found an average score of 7.00 in group 1 vs. 8.64 in group 2 (NS).

Superficial or deep vein thrombosis was not found in any case.

Lastly, 73.3% of the patients in group 1 and 67.7% of the patients in group 2 (NS) did not have sick leave, and the average sick leave was, respectively, 2.6 and 2.3 days in group 1 and 2 (NS).

CONCLUSIONS: We found no value of wearing the compression after a surgical treatment of the varicose veins beyond the 1st postoperative day for pain, ecchymoses and the quality of life after the procedure. These results were obtained in the context of a mini-invasive surgery carried out under tumescent local anesthesia with immediate ambulation.

11:10 am – 11:30 am 18

**Contemporary Results Following
Saphenopopliteal Transposition for
Chronic Femoral Vein Occlusion**

D. M. Coleman, J. E. Rectenwald,
F. C. Vandy, T. W. Wakefield

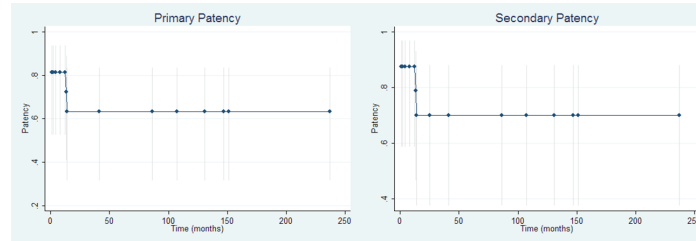
University of Michigan, Ann Arbor, MI

BACKGROUND: Chronic occlusion of the femoral or the proximal popliteal vein responsible for venous insufficiency and the constellation of clinical sequelae that ensue remains a surgical challenge that carries notable patient morbidity and the threat of potential limb loss. Saphenopopliteal bypass remains a surgical reconstructive option for select patients that demonstrate patency of the popliteal vein, greater saphenous vein, saphenofemoral junction and pelvic veins. We sought to analyze our single-institution experience with this technique.

METHODS: A retrospective review of a single-center experience with saphenopopliteal transposition was performed. Pre-operative risk factors and indications for intervention (i.e.: symptomatology including tissue loss) were identified. Duration of follow-up and end-points including clinical improvement, wound healing, patency and limb loss were assessed. A Kaplan-Meier analysis for patency was performed.

RESULTS: Seventeen patients underwent a saphenopopliteal bypass for chronic lower extremity venous obstruction between July, 1988 and August, 2011. Median age at operation was 40 years (range 23–69 years). There was a male predominance noted (N = 12; 71%). All patients suffered from chronic edema and venous claudication. Six patients (35%) had evidence of venous ulceration pre-operatively. Seven patients (41%) underwent a preceding venous intervention (i.e.: iliac stenting or venous thrombolysis). Three patients had a concomitant arterio-venous fistula created to enhance in-flow; two patients underwent concomitant femoral-femoral venous bypass. Five patients (29%) experienced hematoma post-operatively that required operative evacuation; in two patients compression from this hematoma resulted in early graft occlusion. After a median follow-up of 85 months (range 2–236), 82% of patients experienced symptom improvement or near-complete symptom resolution. Four of the six patients with venous ulceration healed their wounds (67%). Of the sixteen patients that underwent Duplex follow-up, primary patency was 68.7% and secondary patency was 75%. (Figure 1) One patient required amputation and there were no deaths. This secondary patency rate exceeds any previously published patency rate.

THURSDAY



CONCLUSIONS: Saphenopopliteal bypass is indicated for chronic venous stasis disease secondary to deep venous obstruction at the thigh. This venous reconstruction option remains a satisfactory and reliable procedure that produces clinical improvement in a selected group of patients and should be considered in a contemporary venous surgical practice.

11:30 am – 11:50 am 19

Liberation Procedure in the Treatment of Chronic Cerebro-Spinal Venous Insufficiency—Is Chronic Cerebro-Spinal Venous Insufficiency Related to Brain Congestive Syndrome Rather than Multiple Sclerosis

D. J. Milic, P. Bosnjakovic, S. Vojinovic,
Z. Sasa, A. Ilic, D. Stojanov, V. Milojkovic

Clinical Centre Nis, Nis, Serbia

BACKGROUND: Chronic cerebro-spinal venous insufficiency (CCSVI) is a term developed to describe compromised flow of blood in the veins draining the central nervous system. It has been suggested by some authors that this condition is related to Multiple Sclerosis (MS). Balloon angioplasty and stenting have been proposed as a treatment option for CCSVI in MS. The proposed treatment has been termed “liberation procedure” though the name has been criticized for suggesting unrealistic results.

METHODS: An open, prospective, single-center study, was performed in order to determine the efficacy of “Liberation procedure” in the treatment of different forms of MS (relapsing remitting, secondary progressive, primary progressive, and progressive relapsing). The evaluation of patient’s status before the procedure, 6 and 12 months after the procedure was performed using: Expanded Disability Status Scale (EDSS); MSFC-Multiple sclerosis functional composite (TIMED 25-FOOT WALK; 9-HOLE PEG TEST; PASAT-Paced auditory serial test) and SDMT-Symbol digit modalities test. The outcome of the procedure was also analyzed using: PRO-patient related outcomes, SF-36 questionnaire, EQ-5D (EuroQol) and Functional Assessment of Multiple Sclerosis (FAMS) quality of life. In order to determine the effects of the procedure blood sample from jugular vein was analyzed 24h before the procedure and 24h, 72h and 7 days after the procedure (pH and bicarbonate, BE, pCO₂ and pO₂, K⁺, Na⁺, CRP).

RESULTS: Overall 205 patients completed the study (86 men and 119 women). Ninety-two patients had relapsing-remitting MS, 103 patients had secondary progressive form and 10 patients had primary progressive MS. Average patient’s age was 41.21 years. The EDSS before the “Liberation procedure” was 5.502 ± 1.95 (visual—0.24 ± 0.71; brainstem—1.06 ± 1.29; pyramidal—3.1±1.16; cerebellar—2.0 ± 0.99; sensory—2.64 ± 0.72; bowel/bladder—1.14 ± 0.87; cerebral—0.87 ± 1.17). On the check-up 6 and 12 months after the procedure the EDSS did not show any statistical significant difference between the pre and post procedural values. However, initial benefit of the procedure was seen in almost 70% of treated patients. This benefit was impossible to quantify due to the fact that neurological tools measures quality of changes in different systems but not the quantity. During the one year follow-up period over 40% of treated patients developed almost all symptoms that were present before the procedure. It is interesting that initial benefit was associated with the

THURSDAY

improvement in the biochemical parameters from the blood sample analysis. This brain decongestions after "Liberation" procedure is probably the reason for relatively fast improvement in clinical signs that we see in some group of treated patients.

CONCLUSIONS: The results obtained in this study suggest that CCSVI is related to Brain Congestive Syndrome rather than MS indicating that "Liberation" procedure may improve clinical signs in patients with MS because of brain decongestion.

11:50 am – 12:10 pm 20 Design of a Vein Valve Replacement

D. N. Ku¹, P. Midha²

¹Emory School of Medicine, Atlanta, GA,

²Georgia Institute of Technology, Atlanta, GA

BACKGROUND: Chronic Venous Insufficiency (CVI) is a condition present in almost 27% of adults in which an insufficient amount of blood is pumped back to the heart due to damaged or poorly apposed one-way valves in the leg veins. Valve repair consists of surgical correction of the malfunctioning valves to improve their function. This generally requires a lengthy surgery and a minimum of 4 days in the hospital. Vein transplants have proven to be effective, however they require finding an intact donor valve, invasive surgery, and hospitalization. A prosthetic vein valve may not require an invasive surgery, human donor, or lengthy hospital stay. We describe the design, verification, and pre-clinical validation tests of a novel prosthetic vein valve.

METHODS: A new valve design is created which is naturally open, and is impregnated with an anticoagulant compound. Verification tests include competency, flow resistance, mechanical fatigue, and *in vitro* thrombogenicity tests. CFD analysis is used to quantify the amount of shear rates within the valve that may induce platelet thrombogenicity. A sheep study has been initiated to evaluate *in vivo* performance.

RESULTS: The valve allows for physiologic flow rates of 400–600 mL/min as it poses little resistance to flow. The valve can tolerate forward flow rates as high as 2800 mL/min. The valve is competent under physiologic backpressures of 35 to 50 mmHg while maintaining an acceptable level of reflux less than 40 mL/min. The valve withstands 500,000 cycles of fatigue testing without damage or loss of competency. The new valve has computed wall shear rates below the threshold value of 4000 s^{-1} , which has been found to initiate thrombus formation by platelet activation and aggregation in cardiovascular implants. This contrasts with other artificial valves that have computed wall shear rates exceeding $10,000 \text{ s}^{-1}$.

The valve has no measurable thrombogenicity to coagulation or platelet adhesion with *in vitro* blood circulation testing in comparison with alternative biomaterials and designs that occlude under identical conditions. The valve with a stent can be delivered by catheter with no migration under back and forward pressures of 100 mmHg. The validation of the device was done through an animal study in sheep external jugular veins. In a sheep study, patency was found at 6 weeks, surpassing many autograft valves.

CONCLUSIONS: A new prosthetic valve design shows promise for definitive treatment of venous valvular disorders.

THURSDAY

12:10 pm – 12:15 pm QS-9 Long-Term Results of Class 3
Compression Therapy Alone Versus
Class 2 Compression Plus Surgery in
the Treatment of Venous Leg Ulcers—
Randomised Controlled Trial

D. J. Milic, S. Zivic, D. Bogdanovic, V. Milojkovic
*Clinic for Vascular Surgery, Clinical Centre Nis,
Nis, Serbia*

BACKGROUND: Venous leg ulcers (VLU) are a major health problem because of their high prevalence and associated high cost of care. Despite the widespread use of compression therapy recurrence rates are high and range between 25–70%. Furthermore, 15% of VLU remain refractory to all treatment modalities, including compression therapy and/or surgery.

METHODS: An open, prospective, randomized, single-center study, was performed in order to determine the efficacy of two different treatment modalities (Class 3 compression alone and Class 2 compression plus saphenous surgery) in the treatment of VLU and in the prevention of VLU recurrences in patients with chronic venous ulcerations and superficial venous reflux.

Two hundred and thirty eight patients (92 men, 146 women; mean age 62 years) with VLU and superficial venous reflux were randomized into 2 groups:

Group A) 123 patients who were treated with class 3 compression therapy, and

Group B) 115 patients who were treated with class 2 compression therapy plus saphenous surgery.

Primary endpoint was ulcer healing at one year of compression treatment while secondary endpoint was ulcer recurrence in the 3 year follow up period using the same grade of compression as it was used during the healing phase.

RESULTS: Fourteen patients did not comply with their randomized compression class, 11 (8.94%) in class 3 and 3 (2.61%) in class 2. The cumulative healing rate was 88.4% (99/112) in the group A and was 68.7% (77/112) in the control group ($P < .001$). The median healing time in the group A was 123 days (range, 28 to 352 days), and in the group B it was 167 days (range, 32 to 335 days). Rates of ulcer recurrence at 3 years were 28% for the class 3 compression group and 31% for the class 2 compression plus surgery group ($P = ns$). For patients with isolated superficial reflux recurrence rates at 3 years were 25% for the class 3 compression group and 25% for the class 2 compression plus surgery group ($P = ns$). For patients who had superficial with segmental deep reflux, recurrence rates at three years were 29% for the class 3 compression group and 33% for the class 2 compression plus surgery group ($P = ns$). For patients with superficial and total deep reflux, recurrence rates at three years were 28% for the class 3 compression group and 31% for the class 2 compression plus surgery group ($P = ns$).

CONCLUSIONS: The results obtained in this study suggest that higher class of compression is more effective in the treatment of VLU compared to lower class compression plus surgery. There is no statistical significant difference in recurrence rate between the higher class compression compared to lower class of compression plus surgery.

THURSDAY

12:15 pm – 12:20 pm QS-10 Changes in Perforator Vein Size and Reflux with Endovenous Ablation of Great Saphenous Vein (GSV)

E. McDonald, C. Dunn, L. Plowman
*Crighton, Olive, Dunn Surgical Group,
Springfield, MO*

BACKGROUND: Treatment of lower extremity (LE) perforator vein (PV) reflux is controversial. A previous study has shown significant decrease in size and resolution of reflux in PV after correction of superficial vein reflux.¹ Our study examines changes in size and reflux of PV in LE after radiofrequency ablation (RFA) of GSV.

METHODS: 61 patients with 82 PV were evaluated with duplex ultrasound for reflux and diameter pre and post RFA (mean = 17 days post procedure). Changes in diameter were tested for significance with a paired t-test. Clinically relevant PV were chosen for study: PV connected to visible refluxing varicose veins CEAP II/III (n = 38), stasis dermatitis CEAP IV (n = 18), and skin ulceration CEAP V/VI (n = 5). To qualify the PV had to measure >0.30 cm and have >0.5 seconds of reflux.

RESULTS: The PV mean distance from the foot was 26.6 cm (\pm 8.7). 30 (37%) PV had no change in diameter (mean = 0.37 cm pre, mean = 0.37 cm post). 16 (20%) PV increased in diameter (mean = 0.38 cm pre, mean = 0.43 cm post, p value 0.01). 33 (40%) PV decreased in diameter (mean = 0.42 cm pre, mean = 0.34 cm post, p value 0.001) and 3 (3%) occluded. Of the 79 remaining patent PV, 76 continued to have greater than 0.5 seconds of reflux post RFA.

CONCLUSION: RFA of GSV did not correct PV reflux in 96% of the clinically relevant veins examined. In 57% of the veins examined, PV diameter increased or did not change. Although, there was a significant decrease in PV diameter in 40%, these veins continued to be greater than 0.30 cm in diameter and have greater than 0.5 seconds of reflux. For perforator veins associated with refluxing varicosities, stasis dermatitis, and venous stasis ulceration, treatment should be considered.

¹Delis K. Perforator vein incompetence in chronic venous disease: a multivariate regression analysis model. *J Vasc Surg.* 2004; 34:774–778.

12:30 pm – 2:00 pm

**VILLAVICENCIO SYMPOSIUM ON AV
MALFORMATIONS/LYMPHOLOGY**

Moderators: Peter Gloviczki, MD
Byung B. Lee, MD

Educational Objectives: The session will highlight the close physiological and pathological interrelationship between lymphatic and venous systems. Historical highlights will be presented. The techniques of isotope lymphangiography for diagnosis and lymphatic manual drainage for therapy will be presented. After conclusion of the session, participants are expected to understand the methodology of grading lymphedema based on lymphangiography and the appropriate indications for and expected benefits from lymphatic manual drainage.

**The Visitor that Sparked the Fire:
The Peter Bent Brigham Hospital of
Boston in 1957**

J. Leonel Villavicencio, MD

**A Story of Rejection, Anxiety,
Desperation and Compassion:
The Story of Congenital Vascular
Malformations**

J. Leonel Villavicencio, MD

**The Impact on the Surgical Residency
Program of the First Venous and
Lymphatic Teaching Clinics in the
Military in 1983: The Clinics at Walter
Reed Army and National Naval
Medical Centers**

J. Leonel Villavicencio, MD

Manual Lymphatic Drainage

Thom Rooke, MD

Lymphatic Imaging

Caroline Fife, MD

THURSDAY

2:00 pm – 3:30 pm

ACP SYMPOSIUM

Moderator: John Mauriello, MD
Lowell Kabnick, MD

Educational Objectives: The participant will understand the dangers of foam sclerotherapy and what really matters when performing foam chemical ablation along with learning what is meant by popliteal vein compression syndrome and why it will be more important in the future. The participant will learn how to image abdominal and pelvic veins with duplex ultrasound and understand why, when and how to treat them in pelvic congestion. The participant will understand and learn why we should be using physiologic testing in our clinical practices today and finally understand the present and be shown future trends for the treatment of ablating refluxing Saphenous veins using all current modalities.

Welcome & Introduction

John Mauriello, MD, President of the ACP

Dangers of Foam Sclerotherapy: Does Method, Gas or Bubble Size Matter?

Marlin Schul, MD

Popliteal Vein Compression Syndrome: What Is it?

John Mauriello, MD

How to Duplex IVC, Iliac Veins and Pelvic Veins

Jeannie White, RVT, RPhS

Pelvic Congestion: When and How Should We Treat?

Melvin Rosenblatt, MD

Why Should We Be Using Physiologic Testing in Our Current Practice?

Julianne Stoughton, MD

By 2015, Where Will Endovenous Ablation Be: Thermal, Chemical, Mechanical or All?

Lowell Kabnick, MD

3:30 pm – 4:15 pm

Coffee Break

4:15 pm – 6:15 pm

POSTER SESSION

Moderator: Joseph Raffetto, MD
Marc Passman, MD

Session 1 (4:15 pm – 5:15 pm)

P1 A Novel Mouse Model to Study Thrombogenesis and Thrombus Resolution with Continuous Blood Flow in the Inferior Vena Cava

J. A. Diaz, C. E. Alvarado, S. K. Wroblewski, N. K. Baker, A. E. Hawley,
P. K. Henke, B. R. Lucchesi, T. W. Wakefield, D. D. Myers
University of Michigan, Ann Arbor, MI

BACKGROUND: The electrolytic inferior vena cava (IVC) model (EIM) that generates thrombus in the presence of blood flow, was recently characterized and published for acute venous thrombosis (VT). To determine whether this model truly represents a continuous flow model in order to examine thrombi at chronic time points, a follow up study was done to demonstrate that the IVC remains patent through 14 days post thrombosis. Here we present the natural history study of VT in the EIM from an acute to a chronic time point.

METHODS: For a chronic characterization of the EIM, C57BL/6 mice (n45) were utilized. In this model a copper wire, inserted into a 25g needle, is placed in the distal IVC and another subcutaneously. An electrical current (250 μ Amp/15 min) activates the endothelial cells leading to thrombogenesis. In this current study, mice were evaluated by ultrasound (US) and contrast venography, via tail vein, and followed from baseline through days 2, 6 and 14, post EIM (Figure 1). Thrombus area and IVC lumen diameters were measured by US using both longitudinal and transverse views. An additional set of mice had their IVCs harvested at the same time points for thrombus weight and histology (vein wall leukocyte counts and thrombus area measurement using Scion Image software). Blood was drawn for soluble P-selectin (sP-sel) and a correlation between thrombus weight and sP-sel was determined. Mice that did not receive EIM were also utilized for baseline sP-sel levels.

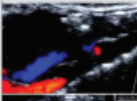
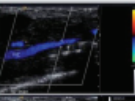

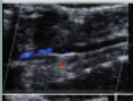




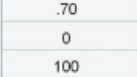
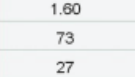
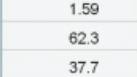
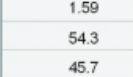


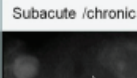
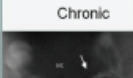
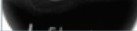
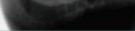
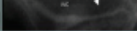
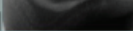
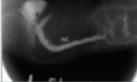
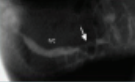


RESULTS:

1. Thrombus formed in all mice undergoing EIM.
2. Blood flow was documented by US and venography at all time points.
3. IVC thrombus size decreased over time as shown by US.
4. Mean time performing ultrasound was 14 minutes per mouse.
5. Thrombus weight decreased over time.
6. sP-sel levels were highest at day 2 and decreased over time.

THURSDAY

7. Thrombus weight and sP-sel showed a positive correlation ($r^2 = 0.87$).
8. IVC Vein Wall: Neutrophils were the most common cell type present in acute VT (day 2) with monocytes becoming the most prevalent in chronic VT (day 14).
9. Thrombus area measurement demonstrated thrombus resolution over time.

Figure 1

	Pre EIM	Day 2	Day 6	Day 14
Ultrasound				
				
				
				
				
IVC (mm)	.70	1.60	1.59	1.59
Thrombus %	0	73	62.3	54.3
Lumen %	100	27	37.7	45.7
Characteristic	NA	Acute	Subacute /chronic	Chronic
Venography				

CONCLUSIONS: The EIM is a solid mouse model of VT that closely simulates clinical VT. It produces a non-occlusive and consistent IVC thrombus in the presence of blood flow at all time points, allowing the study of VT at both acute and chronic time points. Thrombus resolution was demonstrated by several methods and including ultrasound.

P2 Systematic Review of Sonographic CCSVI Findings in Multiple Sclerosis

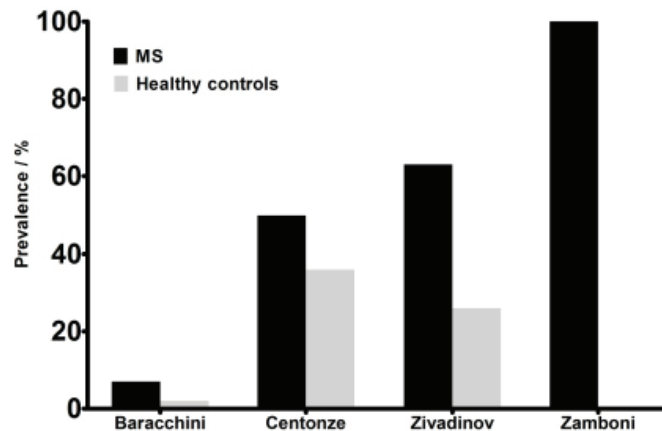
A. Thapar, T. Lane, R. Nicholas, T. Friede, M. Ellis, J. Assenheim,
I. J. Franklin, A. H. Davies

Imperial College London, London, United Kingdom

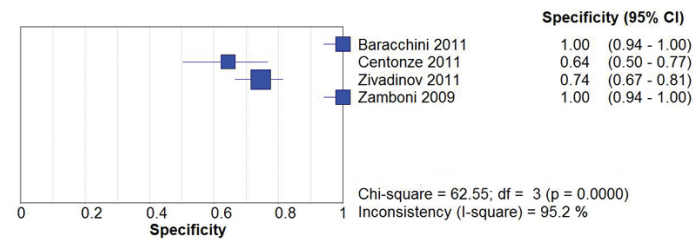
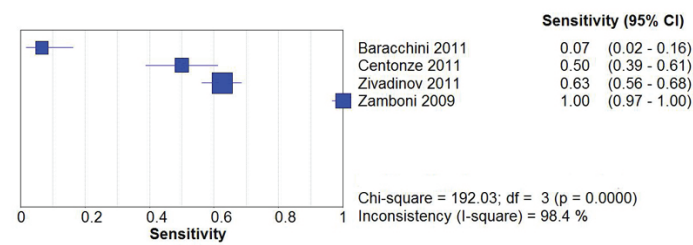
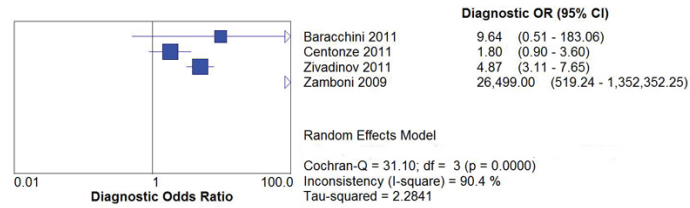
BACKGROUND: The findings of sonographic chronic cerebrospinal venous insufficiency (CCSVI) in patients with multiple sclerosis (MS) are disputed, however it is used in some centres as a screening tool for venography. We performed a systematic review to establish the strength of the association between sonographic CCSVI and MS across methodologically matched studies.

METHODS: Two reviewers independently searched PubMed and EMBASE from 1948 to date using the keywords "chronic cerebrospinal venous insufficiency". Inclusion criteria were: cross-sectional ultrasound studies examining the five sonographic components of CCSVI; MS diagnosed by the revised McDonald criteria; age and gender matched healthy controls and sonographer blinding. Exclusion criteria were: publications considering "clinically isolated syndrome" and isolated optic neuritis, duplicate publication and less than ten subjects. Articles were methodologically assessed using STARD guidelines and formally assessed for heterogeneity using a random effects model (MetaDisc v1.4, Madrid, Spain). CCSVI was defined as the presence of 2 or more concurrent Zamboni criteria.

RESULTS: 4 cross-sectional studies met methodological criteria for inclusion, totalling 833 patients. Prevalence of CCSVI varied from 7–100% in MS patients to 2–36% in controls. Diagnostic odds ratios for CCSVI and MS varied between 2–26, 499 (I² = 94%). Sensitivity of CCSVI for MS varied between 7–100% (I² = 98%). Specificity varied between 64–100% (I² = 95%).



THURSDAY



CONCLUSIONS: The diagnostic accuracy of sonographic CCSVI is variable and currently inadequate for ultrasound to be considered as a screening tool for MS, or as a selection criteria for venography. Sonographic consensus and further high quality studies are required to reliably establish the strength of the association between CCSVI and MS.

P3 The High Incidence of Depression in Chronic Venous Disease

K. Sritharan, T. Lane, A. Davies

Imperial College, London, United Kingdom

BACKGROUND: Depression costs the UK economy over £9 billion and the US economy \$36.6 billion a year in lost earnings. Moreover, by 2030, it is predicted to become the leading cause of disease burden worldwide. The aim of this study was to evaluate the incidence of depression in patients with symptomatic chronic venous disease (CVD).

METHODS: Patients referred to the Vascular Surgeons at a single institution, for management of their CVD, were invited pre- and post-operatively to complete a validated questionnaire relating to quality of life, using the Aberdeen Varicose Veins Questionnaire (AVVQ), EuroQol-5D questionnaire (EQ-5D) and EuroQol-Visual Analogue Score (EQ-VAS); and depressive symptoms, using the Centre of Epidemiological Studies Depression Scale (CES-D). Social, demographic, clinical (CEAP classification, venous clinical severity score (VCSS)) and venous disability score (VDS) data was also collected. Questionnaires were collated and analyzed.

RESULTS: 167 patients, mean age 50.1 years (102 females; 65 males), were recruited. 26.9% of patients (n = 45) with CVD had depression scores suggestive of depression; no patients had been previously diagnosed. Depression scores were not influenced by age (p = 0.31) or gender (p = 0.53). Patients with bilateral disease had significantly higher depression scores (p = 0.0012) compared to those with unilateral disease. There was a weak correlation between depression scores and VCSS (p = 0.0088, r2 = 0.041), but no difference in depression scores between VDS groups 1, 2 or 3 (p = 0.22) or clinical stages of disease according to the CEAP classification (p = 0.14). A correlation was seen between depression scores and AVVQ (p = 0.0035; r2 = 0.052), EQ-5D (p < 0.0001; r2 = 0.30) and EQ-VAS (p < 0.0001; r2 = 0.25). Depression scores post-operatively were lower compared to pre-operatively.

CONCLUSIONS: Depression is common in patients with CVD, with a prevalence comparable to other chronic illnesses. In these patients, depression negatively impacts on quality of life.

THURSDAY

P4 Prevalence of Vascular Anomalies in Klippel-Trenaunay Syndrome

T. Yamaki, A. Hamahata, H. Konoeda, D. Fujisawa, A. Osada, H. Sakurai
Tokyo Women's Medical University, Tokyo, Japan

BACKGROUND: The association of three physical findings including capillary malformation, varicosities, and hypertrophy of bony and soft tissues corresponds to Klippel-Trenaunay syndrome (KTS). However, KTS has mixed vascular anomalies and is difficult to classify vascular lesions. This study was undertaken to analyze various vascular anomalies in patients with KTS.

METHODS: Fifty-six patients with KTS were enrolled. Vascular lesions were divided into predominantly venous defects, predominantly lymphatic defects and mixed vascular defect using Hamburg Classification. Capillary malformations were subdivided into port-wine stain, telangiectasia and angiokeratoma. Presence of truncular and extratruncular vascular malformations was detected using duplex ultrasound and magnet resonance imaging (MRI). Furthermore, reflux in the superficial and deep venous system was also evaluated.

RESULTS: There were 41 (73.2%) patients with predominantly venous defects, 4 (7.1%) with predominantly lymphatic defects and 11 (19.7%) with mixed vascular defects. Capillary malformations were detected in 49 (87.5%) patients. Of these, port-wine stain was the most predominant (35 patients, 62.5%), followed by telangiectasia (28 patients, 50%) and angiokeratoma (16 patients, 28.6%). Extratruncular venous malformations were found in 45 (80.4%) patients whereas extratruncular lymphatic malformations were noted in 14 (25%) patients. On the other hand, lateral megavein was the most frequently found truncular forms which accounted for 50% (28 patients). Deep vein hypoplasia or aplasia was detected in 21.4% of the patients. Aneurysmal dilatation of the popliteal vein was found in 1 patient (1.8%). Reflux was found in 11 patients (19.6%) in the great saphenous vein and in 3 (5.4%) in the small saphenous vein. Deep vein insufficiency was found in 3 patients (5.4%). Ten patients (17.8%) had lymphedema.

CONCLUSIONS: Patients with KTS had variety of vascular anomalies, however, both extratruncular and truncular venous malformations continue to be target for intervention.

P5 Retention of an Autologous Endothelial Layer on a Bioprosthetic Valve for the Treatment of Chronic Deep Venous Insufficiency

C. M. Jones, M. T. Hinds, D. Pavcnik

Oregon Health&Science University, Portland, OR

BACKGROUND: Percutaneous transcatheter implantation of porcine small intestine submucosa (SIS) tissue valves has been investigated and previously reported as a treatment to improve symptoms of chronic deep venous insufficiency (CDVI). Endothelial progenitor outgrowth cells (EOCs), isolated from whole ovine blood, were evaluated in vitro and in an ex vivo flow loop as a source of autologous seeding for SIS endothelialization.

METHODS: 20 bioprosthetic venous valves (BVVs) were constructed from SIS sutured onto collapsible square stent frames. Cell seeding of ovine EOCs in vitro was optimized and endothelialization was evaluated by immunofluorescent staining. Retention of the endothelial layer through BVV loading and delivery (3 valves), in vitro flow (3), and ex vivo flow (4) was evaluated with immunofluorescent staining and histology. In the ex vivo shunt loop, venous blood was pulled from an implanted dialysis catheter, through the BVV, and returned to the sheep.

RESULTS: Immunofluorescent staining of the EOCs on the BVVs after in vitro seeding (optimized at seeding density: 9×10^5 cells/cm²) revealed a confluent monolayer on each side of the valve. When examined by immunofluorescent staining and histology, the endothelial layer remained intact after loading and delivery and when subjected to flow in the in vitro loop. Histology of the BVV subjected to the ex vivo shunt loop revealed retention of the endothelial layer.

CONCLUSIONS: Endothelial layers seeded on SIS were retained under loading and delivery, in vitro flow and ex vivo flow. EOCs are a promising cell source for autologous endothelialization of bioprosthetic valves for the treatment of CDVI.

THURSDAY

P6 Comparison of Diagnostic Methods for Iliocaval Venous Obstruction

C. Koksoy, Z. Unal, E. Arslan, A. Arat

Ankara University, Ankara, Turkey

BACKGROUND: Although the diagnostic value of noninvasive techniques for acute ilio caval venous thrombosis is well established, diagnostic strategy for chronic ilio caval venous obstruction causing venous insufficiency has not been well studied. The purpose of this study was to establish the diagnostic value of computed tomographic (CT) venography, venous duplex ultrasound and contrast venography compared with intravascular ultrasonography (IVUS) for detection of chronic ilio caval venous lesions regardless of the degree of obstruction.

METHODS: Following lower extremity venous duplex examination, patients with chronic venous disease (CEAP-C3 and above) were prospectively enrolled in the study. Vena cava inferior, bilateral common and external iliac veins were examined by duplex ultrasound and CT venography. After this patients underwent contrast venography and IVUS examination for vena cava, bilateral common and external iliac veins. The results were compared in terms of diagnostic value and accuracy.

RESULTS: Forty patients, 34 males and 6 females, mean age 39.3 ± 1.9 years, were enrolled in the study. Twenty-six (32%) patients had active or healed venous ulcer. Using IVUS ilio caval venous lesions regardless of degree of obstruction were diagnosed in 35.5% of the patients. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of different methods for the diagnosis of ilio caval venous obstruction are shown in table. Agreement for presence of ilio caval obstruction was judged as good for venography ($\kappa = 0.75$), mild for CT venography $\kappa = 0.51$) and mild for duplex ultrasound ($\kappa = 0.49$).

CONCLUSIONS: Ilio caval venous obstruction is a frequent feature of chronic venous disease. Compared with IVUS, none of the diagnostic methods used for detection of ilio caval venous obstruction is reliable enough.

Table: Probability Values of Diagnostic Methods for Detection of Iliocaval Venous Obstruction

Method	Sensitivity	Specificity	PPV	NPV	Accuracy
CT venography	66%	94%	87%	83%	84%
Duplex ultrasound	61%	86%	70%	80%	77%
Venography	76%	96%	91%	87%	89%

P7 The Vein Wall Remodelling Activities of Doxycycline and Micronized Purified Flavonoid Fraction Are Likely Hypoxia-Inducible Factor Pathway Independent

C. S. Lim, S. Kiriakidis, E. Paleolog, A. H. Davies
Imperial College London, London, United Kingdom

BACKGROUND: Doxycycline and micronized purified flavonoid fraction (MPFF) are known to modulate vein wall remodelling through inhibition of matrix metalloproteases and anti-inflammatory processes, respectively. However, the exact nature of the upstream regulation of their vein wall remodelling activities remains unclear. Hypoxia-inducible factors are nuclear transcriptional factors that regulate the transcription of various genes involved in mediation of oxygen homeostasis. We recently demonstrated increased activation of the HIF pathway was associated with various biochemical and structural changes in varicose vein wall. We also reported that *in vitro* exposure of varicose and non-varicose veins to hypoxic conditions further activate the HIF pathway. This study aimed to investigate the *in vitro* effects of doxycycline and MPFF at a concentration corresponding to therapeutic dose on the HIF pathway in hypoxic varicose and non-varicose veins.

METHODS: Six varicose and six non-varicose veins obtained from surgery were used to prepare organ cultures. The varicose and non-varicose vein organ cultures were exposed to hypoxia (oxygen 1%), with and without MPFF (Daflon) 10^{-5} M or doxycycline $5\mu\text{g/ml}$ treatment for 16 hours. The veins were then analyzed for HIF-1 α , HIF-2 α , and their target genes expression with Q-PCR and Western blot. The differences between the ΔCt of gene expression were tested with one-way ANOVA with repeated measures followed by Dunnett's test for multiple comparisons. $P < 0.05$ was considered significant.

RESULTS: Treatment of non-varicose vein organ cultures exposed to hypoxia with doxycycline or MPFF did not significantly alter the expression of HIF-1 α and HIF-2 α mRNA and protein compared with those untreated. Doxycycline also did not significantly affect the expression of HIF-1 α and HIF-2 α mRNA and protein in varicose veins exposed to hypoxia compared with those untreated. However, MPFF significantly reduced the expression of HIF-1 α mRNA but not HIF-2 α in varicose veins exposed to hypoxia compared with those untreated. Interestingly, the reduction of the expression of HIF-1 α mRNA in varicose veins by MPFF was not reflected at protein level. The mRNA expression of HIF target genes, namely glucose transporter-1 (GLUT-1), carbonic anhydrase 9 (CA9), vascular endothelial growth factor (VEGF), BCL2/adenovirus E1B 19 kDa protein-interacting protein 3 (BNIP-3), prolyl hydroxylase domain (PHD)-2 and PHD-3 was not significantly altered in both varicose and non-varicose veins exposed to hypoxia and treated with doxycycline or MPFF compared with those untreated.

THURSDAY

CONCLUSIONS: Doxycycline and MPFF at a concentration corresponding to therapeutic dose do not alter the activation of the HIF pathway in varicose and non-varicose vein organ cultures exposed to hypoxia. Our data suggest that although doxycycline and MPFF are known to modulate vein wall remodelling, their effects are independent to the HIF pathway.

P8 Does Ultrasound Guided Compression of the Saphenofemoral Junction During Endovenous Laser Ablation Reduce the Incidence of Heat-Induced Thrombus Formation?

R. Shah, J. Lin

Henry Ford Hospital, Detroit, MI

BACKGROUND: Endovenous laser ablation (EVLA) may cause the formation of endovenous heat-induced thrombus (EHIT) at the saphenofemoral junction (SFJ), leading to pulmonary embolus. Our hypothesis is that ultrasound guided compression of the SFJ during EVLA will minimize the propagation of energy from great saphenous vein (GSV) into common femoral vein (CFV), thus reducing the occurrence of EHIT.

METHODS: Our prospective study included EVLA procedures performed at our institution from December, 2007 to March, 2011 by a single surgeon under local tumescent anesthesia with or without intravenous sedation. Prior to July 2010, EVLA were performed without compression (Group A). From July 2010, EVLA involved compression of the SFJ under ultrasound guidance during the procedure (Group B). All patients underwent pre-procedural vein mapping and a follow-up venous duplex within 1 week after EVLA to establish closure of the GSV and assess for EHIT in the CFV. Data was analyzed using SAS statistical software.

RESULTS: Of the 180 procedures, 5 patients (2.8%) developed extension of thrombus in the SFJ after EVLA. When comparing Group A versus Group B, there were no difference in the mean age (58 vs. 56, $P = NS$) and female gender (77.4% vs. 78.1%, $P = NS$). 4 EHITs occurred in 93 EVLA without compression (Group A, 4.3%) and 1 EHIT in 87 EVLA with compression (Group B, 1.2%). The p-value was 0.36 with a relative risk of 0.26 (CI, 0.03–2.34) and an absolute risk reduction of 3.1%. Due to rare occurrence of EHIT and a small sample size, statistical significance was not established. Kabnick classification of EHIT revealed 1 case of Class 1, 3 Class 2, and 1 Class 3. All treated with 1 week of lovenox with retraction of thrombus into the GSV and 1 patient received 3 months of warfarin.

CONCLUSIONS: We found a lower incidence of EHIT in the group of patients with ultrasound guided compression of the SFJ during EVLA as compared to those without compression. We believe that a physical barrier to the propagation of heat energy would lower the incidence of EHIT and a larger prospective randomized trial would further substantiate our hypothesis.

THURSDAY

P9 Plasma Level of Adiponectin Inversely Correlates with the Severity of Secondary Lymphedema in Lower Extremity

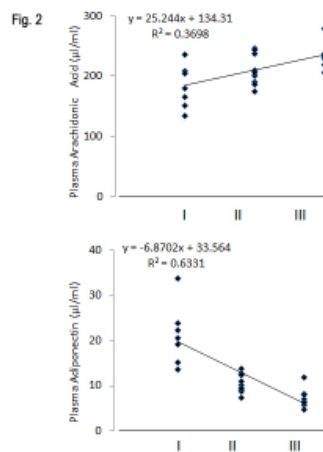
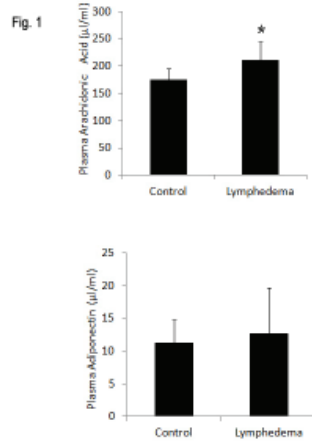
N. Unno, T. Saito, H. Tanaka, N. Yamamoto, M. Suzuki, Y. Mano,
M. Sano, H. Konno

Hamamatsu University School of Medicine, Hamamatsu, Japan

BACKGROUND: The pathophysiology of secondary lower leg lymphedema has yet to be fully understood, which is associated with chronic edema. Pathologically, characteristic morphological changes in adipose tissue has been reported. Derangement of Lymphatic flow is likely to be associated with the degeneration of the adipocytes. Here, we hypothesized that the plasma level of adiponectin, which is secreted exclusively by adipocytes, may be associated with the stage of the lymphedema.

METHODS: Twenty-four patients with secondary lymphedema in the lower limb (24 patients with unilateral limb, 16 patients with bilateral limb), who were diagnosed with medical history and indocyanine green (ICG) fluorescence lymphography. They were classified to three stages according to the classification established by International Society of Lymphology, (Stage I : II : III = 7: 9 : 8 patients). Ten healthy volunteers participated in this study as a control group. We measured levels of cholesterol metabolite, fatty acid metabolite and adiponectin.

RESULTS: The 54% patients exceeded the standard level of plasma total cholesterol. Furthermore, plasma arachidonic acid (AA) in the patients was higher than that in the control group ($211.1 \pm 33.5 \mu\text{g/ml}$, $175.6 \pm 19.8 \mu\text{g/ml}$, respectively, mean \pm SD, $P < 0.01$) (Figure 1). With respect to plasma adiponectin, there was no difference between control group and patients ($11.2 \pm 3.6 \mu\text{g/ml}$, $12.7 \pm 7.0 \mu\text{g/ml}$, respectively, mean \pm SD) (Figure 1). However, among all patients with the lymphedema, there were correlations between plasma AA and the staging (Pearson $r = 0.46$, $P < 0.01$), and between plasma adiponectin and the staging (Pearson $r = 0.63$, $P < 0.01$) (Figure 2). On the other hand, cholesterol metabolite had no relation to the staging.



THURSDAY

CONCLUSIONS: Many of the lymphedema patients had dyslipidemia, meaning that the patients need medical treatment for dyslipidemia. Plasma levels of AA and adiponectin may correlate with the severity of the clinical lymphedema, suggesting that the adipocytes accumulated in the lower leg may be associated with the development of lymphedema formation.

P10 Our Early Experience in Stenting Iliofemoral Veins

M. Kurtoglu, M. Aksoy, I. S. Sarici, A. Ucar, Arzu Poyanli

Istanbul University, Istanbul, Turkey

BACKGROUND: The development of chronic venous insufficiency due to postthrombotic syndrome (PTS) is a frequent consequence of deep venous thrombosis (DVT). Venous balloon dilation and stent therapy has been proposed as an effective treatment of chronic ilio-femoral thrombosis. In this study, we evaluated our first experience gained for PTS lesions of the ilio-femoral segment veins, reporting the short-term outcomes and efficacy of treating a total of twenty patients subjected to balloon angioplasty and stenting of iliac veins for chronic venous obstruction.

METHODS: From June 2011 through July 2011, 20 consecutive patients (23 limbs; 60% women; mean age 44 years; range: 27–75 years) with chronic PTS were referred to our institution for interventional assessment. Preoperative indicators of obstruction were venographic evidence of occlusion, stenosis, or pelvic collateral vessels. Clinical grading and treatment effects were evaluated with the Clinical Etiologic Anatomic Pathophysiologic (CEAP) classification, Villalta scale and Venous Clinical Severity Score (VCSS) for PTS. Here, we are reporting the results of duplex sonography and ascending/antegrade transfemoral venography and functional studies in patients followed in the first 3 months of the study.

RESULTS: Stenting was successfully performed in 100% of the patients. Seven patients (35%) in this series had identifiable hypercoagulable abnormalities. CEAP classification of the clinical material was as follows: C2, n = 1; C3, n = 10; C4, n = 6; and C6, n = 3, with active ulcers present in the last group. According to the VCSS and Villalta scale, there was a reliable decrease in the intensity of PTS manifestations. The VCSS was 10.8 (range: 0–30) before endovascular treatment and 6.0 (range: 0–30) after the treatment ($P < .0001$). The Villalta scale was 15.2 (range: 0–33) before endovascular treatment and 7.0 (range: 0–30) after the treatment ($P < .0001$). The median length of the stented area was 8 cm (range 4 to 10); the median stent diameter was 14 mm (range 6 to 14). Multiple stents (median, n = 12) were necessary in most patients. The most common site for stent implantation was the common iliac vein. The calf circumference below 2 cm of tuberositas tibia decreased from 475.5 ± 6.8 to 441.7 ± 6.2 mm ($p < 0.001$). Before treatment, 100% of patients complained of varying degrees of swelling and pain and this rate was reduced to 35% after the procedure in 6 weeks. Quality of life was reported to be significantly improved in all patients.

CONCLUSIONS: The relief of iliac venous obstruction with balloon angioplasty and stent placement is a minimally invasive, safe technique for PTS patients and clearly relieves in the short term major symptoms, with good patency and minimal morbidity.

P11 Do We Know Exact Relationship of Fiber-Tip and Proximal Vein Segment in Endovenous Laser Ablation?—Consideration of Avoidance of Proximal Thrombotic Complication

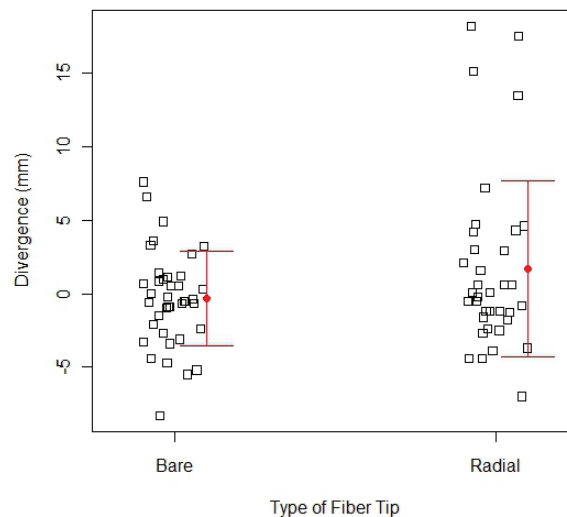
S. Shokoku

Varix Ambulatory Surgery Center, Okayama Daiichi Hospital, Okayama-shi, Japan

BACKGROUND: We consider that relationship between fiber tip and proximal occluded vein segment in endovenous laser ablation of varicose vein is very important, considering potential thrombotic complication caused by unintended proximal occlusion of juxta-junctional saphenous vein and superficial epigastric vein. We evaluated this relationship and compared bare-tip fiber and newly developed radial fiber to establish more accuracy of endovenous laser ablation.

METHODS: We measured the distance between fiber tip and proximal occluded vein segment using Duplex Ultrasound in greater saphenous varicose vein patients. DUS measurement of fiber tip was done intraoperatively and DUS measurement of proximal occluded vein segment was done 1 month postoperatively. We set fiber tip as 0 mm point and proximal divergence as negative value and distal divergence as positive value. Thus negative value means that vein occluded closer to SFJ. Positive value means that vein occluded distal to the fiber tip. There are 39 limbs underwent endovenous laser ablation by bare-tip fiber (BTF group) and 36 limbs by radial fiber (RF group). Statistical analysis was done by t-test.

THURSDAY



RESULTS: BTF group measurement was -0.3 ± 3.2 mm and RF group measurement was 1.7 ± 6.0 mm ($p = 0.08$). This result shows that there was no significant proximal divergence of occluded vein segment from fiber tip in both group. RF group has more distally located venous occlusion compared to BTF group, even though it did not reach statistical significance.

CONCLUSIONS: This study showed both bear-tip fiber and radial fiber safely created occlusion proximity to fiber tip avoiding hazardous thrombotic complication. Newly developed radial fiber tends to have occlusion distally to fiber tip, thus potentially safe treatment modality compared to bear-tip fiber.

P12 Multicenter Evaluation of a Novel Patient Reported Outcome Tool for Assessing Efficacy of Varisolve™ Polidocanol Endovenous Microfoam (PEM) for Treatment of Symptomatic Visible Varicose Veins with Saphenofemoral Junction (SFJ) Incompetence: The ProtoSymQ

K. Gibson

Lake Washington Vascular, Bellevue, WA

BACKGROUND: In preparation for U.S. Phase 3 trials of Varisolve™ proprietary Polidocanol Endovenous Microfoam (PEM) for endovenous microfoam ablation (EMA) of the great saphenous vein (GSV), a pilot study was conducted. Study objectives were: evaluate the sensitivity and specificity of efficacy endpoints for varicose vein symptoms improvement using a novel, patient-reported outcome instrument (ProtoSymQ); evaluate the use of photographic assessment of change in appearance assessed by a blinded physician panel; and assess the ability to blind patients to treatment assignment.

METHODS: This was a 12-week, randomized, single-blind, placebo-controlled, parallel-group design where eligible patients were randomized to ultrasound-guided EMA using 1% PEM or placebo consisting of an agitated saline injection. Only one limb per patient was eligible for treatment. The investigator and sonographer were aware of treatment assignment; for blinding, patients were physically shielded from viewing the procedure and post procedure duplex ultrasound scans. Patients returned at 1, 4, 8, and 12 weeks for follow-up assessments. Outcome assessments included: ProtoSymQ in addition to traditional disease-specific instruments, standardized photography, and duplex ultrasound. After 12 weeks, placebo patients could elect to receive treatment with open-label 1% PEM.

The primary endpoint was the absolute change from baseline in ProtoSymQ (Week 8). Changes in photographic appearance (blinded review), physiological response to treatment (duplex ultrasound) and patient blinding were assessed and safety data was obtained.

Table: Primary Endpoint: Change from Baseline in Symptom Questionnaire (ProtoSymQ) Scores at Week 8 (LOCF)

Measure	Adjusted Mean Change from Baseline (SE)		Comparison vs. Agitated Saline		
	Agitated Saline (n = 37)	PEM 1% (n = 39)	Estimate	(95% CI)	P-value
ProtoSymQ	16.7 (3.18)	30.7 (3.04)	14.05	(6.0–22.1)	0.0009

RESULTS: The two treatment groups were similar in demographic and baseline characteristics. The patient population consisted of seventy-seven subjects aged 18–65 years with symptomatic varicose veins (CEAP C2–C5), SFJ reflux > 0.5 seconds and visible varicosities. Thirty-eight patients were randomized to receive placebo and 39 PEM. The majority of subjects were female (80.5%) and mean age was 47 yrs.

At all time points, changes from baseline in ProtoSymQ, vein appearance, and treatment responders (duplex ultrasound) were statistically significantly greater ($p < 0.001$) for the PEM 1% group compared with placebo.

In the PEM 1% group, the most frequently reported AEs were mild and associated with study drug administration (contusion, limb discomfort, pain). All but one patient was successfully blinded.

CONCLUSIONS: Single-blinded studies of varicose vein treatment with PEM can be successfully performed. The ProtoSymQ questionnaire demonstrated PEM 1% treatment benefit over placebo for improvement of varicose vein symptoms and was highly correlated with other traditional instruments. Assessment of appearance with central review of blinded standardized photographs was efficient for objective documentation of efficacy.

Treatment with PEM 1% was effective and generally well-tolerated.

Session 2 (5:15 pm – 6:15 pm)

P13 Surgical Bypass for Non-Malignant Occlusive Disease in Inferior Vena Cava and Iliac Veins: Is it Still an Option?

J. E. Anaya-Ayala, M. K. Adams, N. Ismail, C. J. Smolock, J. A. Leon-Becerril,
B. A. Johnson, M. G. Davies, A. B. Lumsden, E. K. Peden

Methodist DeBakey & Vascular Center, Houston, TX

BACKGROUND: Surgical bypass for nonmalignant occlusion of the Inferior Vena Cava (IVC) and iliac veins in the era of endovascular therapy is rarely performed. These techniques are only reserved for severely symptomatic patients who failed previous endovascular interventions. However, due to the complexity and scant long-term reports, its use remains limited to only experienced centers. We evaluated our outcomes at The Methodist Hospital. Patient demographics, surgical technique, complications, reinterventions, and factors influencing morbidity were reviewed.

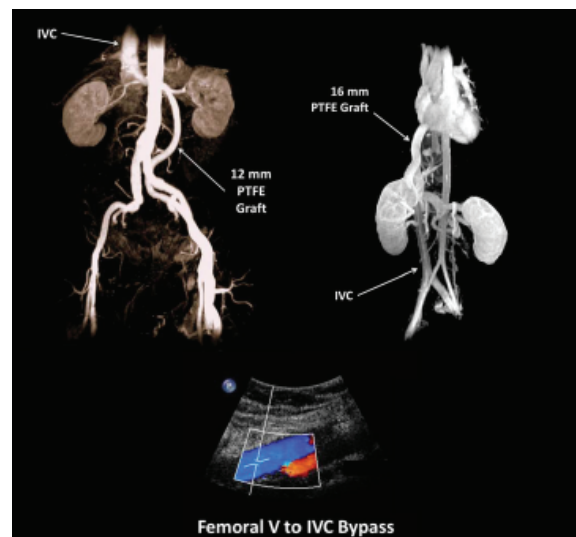
METHODS: From February 2005 to September 2010, seven patients (57% males with a mean age of 52 ± 27 years) with occluded vein segments at the IVC or Iliac veins underwent venous-venous bypasses. Of these patients, six had documented history of DVT. CEAP classification was used to measure severity of disease. Hemodialysis-related central venous occlusion patients were excluded from this review. Indications included Post-Thrombotic Syndrome (PTS) in six patients and Obliterative Hepatocavopathy (OH) in one patient. Polytetrafluoroethylene (PTFE) was used for all surgical bypasses. All seven patients had failed previous percutaneous interventions.

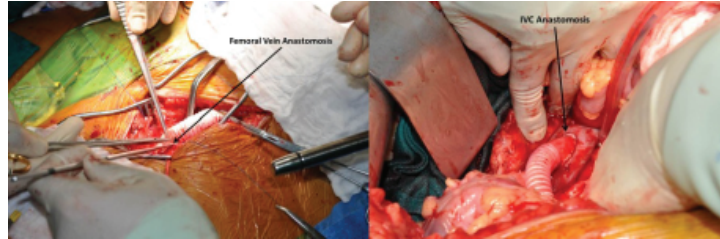
RESULTS: Technical success was achieved in all seven cases (100%). Table I summarizes patient demographics, clinical features, and bypass configuration. Improvement of symptoms was seen in 6 patients (86%) with an average decrease in CEAP classification of two. Early surgical complications include one case of wound infection at the groin incision treated with IV antibiotics and one case of abdominal wall hematoma formation requiring drainage. Late complications include two cases of graft thrombosis; one case resulting in the addition of a jump graft to the renal vein, and the other resulting in failure of the graft. Additionally, there were three cases of graft stenosis that were treated with stent placement and angioplasty of the graft. Currently, six patients continue Coumadin therapy, and one patient is taking Aspirin. Ultrasound surveillance demonstrates patent grafts in six of the seven patients with a mean follow-up of 37 months.

THURSDAY

Table 1. Patients Demographics and Clinical Aspects

Patient No.	Age/ Sex	Medical History	Indication for Bypass	Bypass	Pre-Op CEAP Classification	Current CEAP Classification
1	66 y/M	DM, HTN, Glaucoma	PTS	L Femoral Profundus v-IVC BPG, AVF	6	5
2	39 y/M	DM, HTN, Protein C and S Deficiency	PTS	L Femoral v-IVC BPG, AVF	6	3
3	41 y/M	PAD	PTS	R Femoral v-Suprarenal IVC BPG, AVF	6	6
4	69 y/F	CAD, HTN, PAD, Hypothyroidism	PTS	R Femoral v-IVC BPG, AVF	6	3
5	56 y/M	DM, HTN, PAD	PTS	L Femoral Profundus v-IVC BPG, AVF	6	3
6	63 y/F	CAD, HTN, HLP, Hypothyroidism	PTS	L Femoral v-IVC BPG	3	3
7	25 y/F	HTN	OH	Infrahepatic to Suprahepatic IVC BPG	3	0





CONCLUSION: Open surgical management for nonmalignant occlusion of the Iliocaval system remains a viable option when percutaneous attempts of recanalization have failed. This approach may offer some benefit in carefully selected patients.

THURSDAY

P14 Incidence of Iliocaval Venous Obstruction in Patients with Venous Ulcer

C. Koksoy, Z. Unal, E. Arslan, M. Arbatli, U. Sanlidilek
Ankara University, Ankara, Turkey

The studies investigating the incidence of ilio caval venous obstruction in patients with venous ulcer are limited. In this study, we examined a series of patients with healed or active venous leg ulcers to determine the objective incidence of ilio caval venous obstruction.

Patients with healed or active venous leg ulcers prospectively underwent lower extremity duplex ultrasound imaging to identify the presence of venous reflux in the deep, perforating and superficial systems. Contrast venography and intravascular ultrasonography (IVUS) via either femoral or popliteal vein were performed to determine the presence of ilio caval obstructive lesions regardless of degree of stenosis.

Sixty patients, 54 males and 6 females, mean age 38 ± 10.1 years, were enrolled in the study. Twenty-six (32%) patients had active or healed venous ulcer. Patients had ulcer in 71 legs with average number of 1.2 ± 0.5 . Eleven patients had bilateral leg ulcers. Using venous duplex, superficial, deep and at least one perforating vein insufficiency were diagnosed 86%, 86% and 91% of 71 legs, respectively. Using venography and IVUS the incidence of venous obstruction in vena cava, common iliac and external iliac veins were 15%, 42% and 47.9% respectively. May-Thurner syndrome was diagnosed in 5 (8.3%) patients. When all concomitant lesions were calculated, 35 of 60 (58%) patients and 38 of 71 (53.5%) extremities had obstructive lesions in ilio caval venous segment.

Ilio caval venous obstruction is a common and under-appreciated finding of venous ulcer. Results of this study revealed that half of patients with venous ulcer have ilio caval venous obstruction. We believe that ilio caval venous outflow obstruction should be investigated in patients with venous leg ulcers.

P15 Correlation of 3-Dimensional CT Venography with Intravascular Ultrasound in the Diagnosis of Ilio-Caval Venous Outflow Obstruction

W. Marston, J. Crowner

University of North Carolina, Chapel Hill, NC

BACKGROUND: Ilio-caval venous obstruction (ICVO) has been reported as an underlying cause of venous hypertension in patients with severe chronic venous insufficiency (CVI). Intravascular ultrasound (IVUS) has been recognized as the gold standard diagnostic method for ICVO. However, IVUS is an invasive modality that is not well suited as a screening diagnostic test for ICVO. In this study we evaluated the correlation between CT venography (CTV) and IVUS for the diagnosis of ICVO.

METHODS: Patients with CEAP clinical class 4–6 CVI were evaluated for ICVO with CTV. Intravenous contrast was administered with a delay timed to obtain maximal venous illumination. Two millimeter cuts were obtained with overlapping to allow 3-dimensional imaging with centerline reconstructions based on each iliac vein and the inferior vena cava (IVC). The maximal percent of luminal obstruction and length of obstruction were determined in each iliac vein and the IVC. Patients with at least 50% obstruction in one of the iliac veins or IVC went on to undergo percutaneous venography and IVUS. The maximal degree and length of obstruction was determined from IVUS examination and was compared to the data from CTV. When possible, both iliac veins were evaluated with IVUS.

RESULTS: Twenty-eight patients with CEAP clinical class 4–6 CVI were entered into the study and a total of 38 iliac veins were evaluated with both CT venography and IVUS. By CT venography the maximal degree of stenosis was measured as 80% obstruction in 38%. The maximal degree of stenosis correlated well between CT venography and IVUS with 91% of measurements agreeing to within 15% of each other. In all 3 cases where the two modalities did not correlate, IVUS defined greater obstruction than CT venography. The length of ICVO varied greatly, from 1 cm to 35 cms in the patients studied. Some patients demonstrated sequential areas of obstruction with intervening areas of normal appearing vein, both on CTV and on IVUS.

CONCLUSIONS: Three dimensional CT venography is a useful diagnostic study for the identification of ICVO in patients with severe CVI. It correlates well with IVUS and is useful in planning for venous intervention. Patterns of ICVO are variable and should be categorized by a system that stages levels of increasing severity similar to the TASC criteria for arterial obstruction.

P16 Despite Informed Consent Patients Understanding of the Risks & Benefits of Endovenous Therapy Is Poor

K. Sritharan, A. Davies

Imperial College, London, United Kingdom

BACKGROUND: Patients understanding of the risks and benefit of a procedure will influence their willingness to undergo treatment. We evaluated the perceived risks and benefits of endovenous procedures; an area not previously studied.

METHODS: Patients referred for management of their Chronic Venous Disease (CVD), were invited pre-operatively, following the consent process, to complete a 9-item questionnaire regarding their views on the benefits and risks of endovenous ablative therapy. All participants received a procedure information leaflet at the initial consultation. Social, demographic and clinical (CEAP classification, ASA grade) data was also collected.

RESULTS: 64 patients (mean age 53.7 years), 24 males (37.5%) and 40 females (62.5%), were recruited. 27.5% had C1/2, 55.1% C3/4 and 18.4% C5/6 clinical stage disease. 82% of patients were of ASA grade I; and the majority of patients (64.1%) had their procedure under local anaesthesia. 57.8% sought more information about the procedure after the initial consultation; of these 31% asked their hospital doctor and 27% used the internet, whilst only 22% read the information leaflet. The rate of progression to ulceration was estimated to be 33.5% (range, 0–90%), and the greatest perceived benefit of the procedure was pain relief; but 26.6% were unclear of the benefits. Moreover, 14.7% thought the procedure would help other symptoms unrelated to CVD, such as weight loss.

The incidence of complications was estimated to be 14.3% (range, 0–95%), and the majority (66%) classed endovenous ablation as low risk; 8% could not quantify the risk. The complication most patients (73%) were aware of and concerned about (30%) was DVT; 33% of patients were not concerned about developing any complication.

CONCLUSIONS: The perception of risk-benefit for varicose vein surgery, despite reinforcement with information leaflets prior to intervention, is poor. This study emphasizes the need for improved patient education.

P17 Pulsatile Ante-Grade Great Saphenous Flow Is Associated with Severe Chronic Superficial Venous Insufficiency

C. R. Lattimer, M. Azzam, G. C. Makris, E. Kalodiki, S. Somaiyajulu, G. Geroulakos

Ealing Hospital & Imperial College, London, United Kingdom

BACKGROUND: Ante-grade flow and reflux in the Great Saphenous Vein (GSV) are visualized with color duplex using a manual calf compression provocation test. Reflux >0.5 sec defines haemodynamic Superficial Venous Insufficiency (SVI). Pulsatile flow in deep and perforating veins (in contrast to spontaneous flow with respiratory phasicity) has been demonstrated in 11% of patients undergoing radio-frequency styler ablation for perforating vein incompetence. Its presence in that series was documented as being associated with an 80% failure of this technique. The present study is observational aiming to investigate the prevalence and rate of spontaneous pulsation within the GSV in patients with significant saphenous reflux compared to non-refluxing controls.

METHODS: Twenty-seven consecutive patients (32 legs, median VCSS = 5 (0–11)) attending the varicose vein clinic and 23 consecutive ambulatory volunteers (46 legs) had their GSV assessed at mid-thigh using color duplex. Subjects were examined standing with the hips resting against an adjustable couch, bearing weight on the contra-lateral leg, with the test leg touching the ground. The presence of flow and reflux were initially determined using manual calf compression. The GSV diameter and saphenous pulse rate were then recorded after a minute of dependency. The number of pulsations was counted from video recordings.

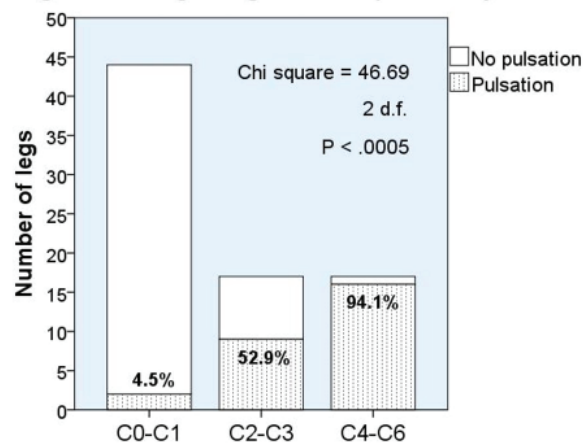
RESULTS: Baseline characteristics and results are illustrated (Table 1). The resting saphenous pulse, if present, was discrete, monophasic and irregular irrespective of respiration. Pulsation was detected in 22/26 (84.6%) of legs with C_{3-6} (C part of CEAP) and in only 5/52 (9.6%) of legs with C_{0-2} (Figure 1). Reflux occurred in 8/32 legs (25%) without saphenous pulsation ($C_0 = 2$, $C_1 = 1$, $C_2 = 3$, $C_3 = 2$). The median GSV diameter was significantly elevated in the presence of pulsation (No pulse: 3.5 (1.5–8.1) mm. Pulse: 7 (4–9.4) mm. $P < .0005$). The median refluxing GSV diameter in GSV pulsators compared to non-pulsators was 7 (4–9.4) mm versus 5.1 (2.7–8.1) mm respectively ($P = .003$).

THURSDAY

Table 1: Duplex Detectable Saphenous Pulsation and Rate Stratified by GSV Reflux

	GSV Reflux >0.5 Seconds	GSV No-Reflux <0.5 Seconds
Number of legs	32	46
Age (years)	46 (30–80)	46 (22–96)
M:F (legs)	12:20	13:33
C part of CEAP (legs)	C0 = 2, C1 = 1, C2 = 6, C3 = 8, C4 = 13, C5 = 1, C6 = 1	C0 = 30, C1 = 11, C2 = 2, C3 = 1, C4 = 2
Median GSV diameter (mm)	6.9 (2.7–9.4)	3.5 (1.5–7.2)
Detectable pulsation	24/32 (75%)	3/46 (6.5%)
Median pulsations/min	52 (22–95)	18 (16–75)

Fig 1: Percentage of legs with GSV pulsation by C class



CONCLUSIONS: The high prevalence of pulsatile ante-grade saphenous flow is a novel observation in patients with severe SVI. It is detectable in 75% of patients with GSV reflux and increases with clinical severity. It is a marker of significant venous disease and could supplement the duplex examination. Further work is needed to establish the clinical relevance of this new marker of venous disease.

¹Hingorani JP et al. *J Vasc Surg.* 2009;50:844–8.

P18 Major Venous Reconstruction During Abdominal Oncologic Surgery

S. Min, S. M. Kim, I. M. Jung, T. Lee, J. Ha, J. K. Chung, S. J. Kim

Seoul National University Hospital, Seoul, Korea

BACKGROUND: During the operation for intra-abdominal malignancy, the conditions of venous invasion or adhesion could be encountered. In such cases, venous reconstruction is required for complete resection of the tumor. But reconstruction of the large veins such as inferior vena cava (IVC), portal vein (PV), and renal vein (RV) can be a challenge to a vascular surgeon because of the lack of suitable autogenous conduit.

METHODS: From January 2007 to August 2011, thirteen patients underwent combined venous resection and reconstruction during major oncologic surgery. We analyzed the methods, conduits, graft patency, and patient survival.

RESULTS: The most common primary malignancy was pancreatic cancer (7/13, stage II or III). Others included one case of stage III transverse colon cancer, metastatic colon cancer, recurrent gastrointestinal stromal tumor (GIST), recurrent pheochromocytoma, and fibrous histiocytoma. The most common cause of venous reconstruction was tumor invasion (n = 11). The other causes were severe adhesion (1) and dissection injury (1). The involved veins were SMV (6), PV (4), IVC (2), and left external iliac vein (1). The operative methods were resections and end-to-end anastomosis in 5 patients and wedge resections with venoplasty in 4. Two patients were performed bovine patch repair due to tumor invasion of IVC and PV. In one patient with pancreatic cancer with PV invasion, resection of PV in 3 cm length and reconstruction with great saphenous vein (GSV) was performed. Because of the size mismatch between PV and GSV graft, bowel congestion developed. Interposition graft with polytetrafluoroethylene (PTFE) was made, but occlusion was found 2 days later during the second look operation. To overcome the size discrepancy, PV was reconstructed with spiral graft of GSV. In one case of invasive T-colon cancer, both SMV and SMA were transected inadvertently, which were repaired with GSV interposition grafts. Postoperatively low molecular weight heparin was used in three patients. Immediate thrombosis was occurred only one case of PTFE graft. During the mean follow-up of 7 months, significant stenosis (>50%) was detected in 4 cases without clinical symptoms, including 3 E-to-E anastomosis and 1 wedge resection with venoplasty. Patients with patch angioplasty or interposition graft maintained the patency. No patients died during the study period.

CONCLUSIONS: Many of the involved vein segments were repaired primarily. When tension-free anastomosis is impossible, the spiral graft with GSV or bovine patch graft are good options to overcome the size mismatch between autologous vein graft and major veins. Further follow-up of these cases are needed to demonstrate the long-term patency

P19 Interface Pressure Under Compression Bandages: Current Practice and a Way to Consiste

F. Lurie, R. L. Kistner

Kistner Vein Clinic and University of Hawaii, Honolulu, HI

BACKGROUND: Using bandages is the most common modality of compression therapy in patients with venous ulcers. The diversity of materials and techniques that are used for bandaging is substantial, but unlike for compression stockings, the standards for interface pressure produced by bandages do not exist. A few studies demonstrated that variation in interface pressure are substantial and can be reduced by training. However all these studies used one point pressure measurement, usually at B1 point. The changes in interface pressure under bandages from ankle to knee were never studied.

The aims of this study were to investigate real-life variability in interface pressure under bandages, and to attempt to decrease this variability by interface pressure monitoring.

METHODS: Interface pressure was measured at 5 points along the calf (B, B1, C, D, and a point between B1 and C). The HSS prototype device by Curie Medical Specialties, Inc. was used. Seven experienced nurses and three vascular surgeons from three different institutions participated in the study. During the first phase of the study, interface pressure was measured during routine visits of 30 venous ulcer patients. Nurses and surgeons who applied bandages were blind to the pressure measurements. During the second stage, nurses and surgeons were monitoring pressure as they applied bandages to three consecutive patients (training). Two weeks later, the pressure measurements were repeated blindly to assess the effect of training.

RESULTS: Interface pressure measurements during routine application of bandages showed significant variation in the magnitude of applied pressure, and in the special pattern of pressure. The patterns varied randomly from graduated pressure to reversed graduated pressure. The same provider applied different pressures to different patients and to the same patient at different days. Monitoring pressure resulted in consistent magnitude and spatial pattern of pressure with training effect lasting for at least two weeks.

CONCLUSIONS: Current practice of bandaging results in random uncontrolled and unknown interface pressure applied to the leg. Monitoring the pressure during the bandaging may ensure consistency in bandage application.

P20 Adjustable Compression Wraps Are a Clever Alternative to Conventional Multi-Component Bandaging in the Initial Treatment of Leg Lymphedema

R. J. Damstra¹, D-A.A. Lamprou¹, H. Partsch²

¹Department of Dermatology, Phlebology and Lymphology, Nij Smellinghe Hospital, Drachten, The Netherlands; ²Private Practice, Vienna, Austria

BACKGROUND: Inelastic multicomponent bandages applied by specialized medical staff are the standard of care for compression therapy in the initial treatment phase of lymphedema.

AIM: To compare the efficacy of adjustable compression wraps (Juxta fit™ device, JFD) with classic lymphedema bandages applied by experienced staff concerning volume reduction and interface pressure loss in the initial treatment phase of lymphedema of the lower extremities.

METHODS: Thirty hospitalized patients suffering from moderate to severe lymphedema of the leg were randomized into 2 groups. Fifteen patients received the new Juxta fit™ device. The JFD was initially demonstrated and applied by a nurse, then after 2 hours it was removed and the patient applied the device himself and was allowed to readjust the device as needed according to his feelings during the following 24 hours. The control group (n = 15) was treated with conventional Inelastic Multi-component Compression bandages (IMC) (Tricoflex™ BSN) applied by an experienced nurse.

After the initial application, both the JFD and IMC were removed after 2 hours and reapplied by either the patient (JFD) or by a nurse (IMC). The JFD group was allowed to make adjustments to the device as needed over the next 24 hours.

Lower leg volume was measured by means of water displacement volumetry before compression, after 2 and after 24 hours. Interface pressures between skin and the compression device were measured at the distal medial leg after application, 2 hours later before removal, after reapplication, and before removal 24 hours later.

RESULTS: The median volume reduction after 24 hours was 339 ml (IQR 231–493) in the JFD group (–10, 3%) and 190 ml (113–296) in the IMC group (–5, 9%). ($p < 0, 05$, Mann-Whitney). The interface pressure dropped significantly after two and 24 hours in the IMC group (–50% and –56%), but significantly less in the JFD group (–26% and –44%), mainly due to self-adjustment. The median pressures achieved after self-application of JFD (52 mmHg; IQR 44–62) were in the same order as those produced by the nurses after the first application (53 mmHg; IQR 39–59).

THURSDAY

CONCLUSIONS: In patients with moderate to severe lymphedema of the legs JFD achieved a significantly more pronounced volume reduction after 24 hours than IMC bandages. After being instructed how strongly the device should be applied and wearing it for 2 hours patients are able to don it and make necessary adjustments by themselves. Autonomous handling of JFD seems to improve the clinical outcome and is a promising step in the direction of self-management concerning compression.

P21 Minimally Invasive Treatment of Chronic Ilio-Femoral Venous Occlusive Disease

M. de Wolf¹, C. Arnoldussen¹, R. de Graaf¹, M. de Haan¹, J. Grommes², C. Wittens¹

¹Maastricht University Medical Center, Maastricht, Netherlands, ²Aachen University Hospital, Aachen, Germany

BACKGROUND: As one of the primary etiologies of the post-thrombotic syndrome chronic venous obstruction is a huge burden on patient quality of life and medical costs. In this study we evaluate the short- and midterm results of endovenous recanalisation by angioplasty and stenting in chronic ilio-femoral deep venous occlusions. Design: combined retrospective/prospective observational study.

METHODS: Patients with venous claudication combined with duplex and MR confirmed ilio-femoral and caval occlusions were treated in our tertiary hospital by endovenous angioplasty and stenting. Patients presenting with recent deep vein thrombosis (<1 year) were excluded. Patients treated in 2009 and 2010 were included retrospectively. From 2011 onward patients were included prospectively. Occlusion was confirmed on Magnetic Resonance Venography and duplex ultrasonography. Safety and feasibility were clinically evaluated during the procedure and during follow-up. Re-occlusions and other types of treatment failure were evaluated during a maximum follow-up of 26 months by ultrasonography and venography.

RESULTS: 62 procedures were performed in 51 patients with an average age of 45 years (range 18–75 years). 85% had a history of deep venous thrombosis. 55% of subjects were diagnosed with May-Thurner syndrome, 79% of the May-Thurner subpopulation was female. 47 procedures were performed in the left, 5 in the right and 7 in both lower extremities. Furthermore, in 25 patients the vena cava inferior was partially stented. The average number of stents used in a procedure was 2,4 (median 2).

Primary patency was 82% after 1 year. Assisted primary and secondary patency rates were 97% and 94% respectively at 1 year.

Re-thrombosis within 1 day occurred in 8% of the procedures, another 3% occluded during hospital stay. All re-occlusions occurred within 6 months after the after the procedure. Bleeding complication occurred in 12% of procedures.

Relief or significant improvement of symptoms of chronic venous occlusive disease was achieved in 82% of patients.

CONCLUSIONS: Endovenous recanalisation by angioplasty and stenting of long term occluded ilio-femoral vein segments is a safe and effective treatment option with good midterm results. The majority of re-occlusions can be adequately treated by a secondary procedure.

P22 Changes in Venous Reflux After Iliac Vein Stenting

A. Faisal AL-Taie, A. Hingorani, E. Ascher, R. Jimenez, E. Aboian,
N. Marks, T. Jacob

Maimonides Medical Center, Brooklyn, NY

INTRODUCTION: Iliac vein stenting with the use of IVUS is a procedure being used to treat venous insufficiency. However, limited data is available on its hemodynamic efficacy. We reviewed retrospectively our experience performing venograms of the Iliac veins with IVUS between 2008 and 2011. Our goal was to determine if there was objective evidence, as demonstrated by duplex studies, if the degree of reflux was improved or worsened in patients who underwent stenting of the iliac veins.

METHODS: A total of 172 limbs were evaluated, 103 in females and 69 in males. (Average age 61.9, mean age 63). Of these a total of 137 veins were stented. (iliac vein) The distribution of venous insufficiency for this cohort was C1-1, C2-6, C3-69, C4-21, C5-38, C6-37 by the CEAP classification.

RESULTS: Preoperative venous reflux in patients that received an ipsilateral stent of greater than 500 milliseconds was noted in 23 GSV (R), 31 GSV (L), and 7 SSV (R), 20 SSV (L), and greater than 1000 milliseconds for 12 Deep veins (R), 30 Deep veins (L). Post operative venous duplex in patients that received an ipsilateral stent of greater than 500 milliseconds was noted in 36 GSV (R), 35 GSV (L), and 28 SSV (R), 24 SSV (L), and greater than 1000 milliseconds for 31 Deep veins (R), 47 Deep veins (L). Pre-operative venous reflux in patients without stenting, of greater than 500 milliseconds was noted in 12 GSV (R), 4 GSV (L), and 3 SSV (R), 2 SSV (L), and greater than 1000 milliseconds for 6 Deep veins (R), 3 Deep veins (L). Post operative venous duplex in patients of greater than 500 milliseconds was noted in 8 GSV (R), 11 GSV (L), and 9 SSV (R), 9 SSV (L), and greater than 1000 milliseconds for 13 Deep veins (R), 22 Deep veins (L). Changes in reflux after stenting demonstrated: 59 improved, 38 worsened venous duplex and 34 the same.

CONCLUSION: Our data suggests that in spite of iliac vein stenting, the reflux as measured by duplex is often improved.

P23 Five-Year Delayed Removal of Symptomatic, Migrated Retrievable Inferior Vena Cava Filter

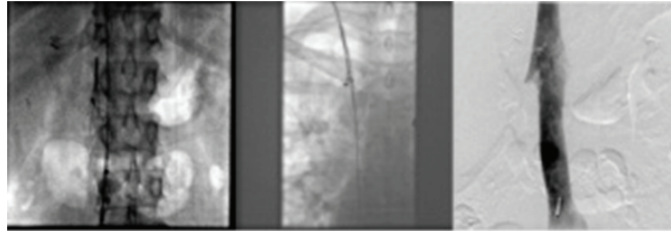
E. J. Moreno-Martinez, L. Choi, C. C. Cheng, M. B. Silva, Jr.
UTMB, Galveston, TX

BACKGROUND: Inferior vena cava (IVC) filters are frequently used to prevent pulmonary embolism in patients with deep vein thrombosis and a contraindication to anticoagulation. Instructions for use of removable filters are variable but generally indicate an optimal time period for retrieval (23–365 days). Despite the development of removable IVC filters, removal rates are low, estimated at 1.2 to 5.1%. IVC filters may be associated with serious long term complications, with IVC wall erosion reported in 5 to 38% of patients. The technical feasibility and safety of delayed removal outside the indicated window for retrieval remain to be determined.

METHODS: We present a case of a 42 year-old female patient with remote history of Bard G2 IVC filter insertion (median reported removal time 144 days) for deep venous thrombosis after a motor vehicle accident. She was admitted 5 years later to our institution with acute onset of abdominal pain, fever and acute blood loss anemia. Computed tomography scan of the abdomen and pelvis demonstrated erosion of several filter struts through the IVC wall at the level of the duodenum. There was a fluid collection and associated drop in hemoglobin from 11 mg/dL to 8 mg/dL, suggestive of retroperitoneal hematoma. Esophogastroduodenoscopy and upper gastrointestinal series did not demonstrate duodenal perforation. The patient's pain improved, fever resolved, and hemoglobin level stabilized. She was discharged home on hospital day 7. She had no recurrent symptoms when seen in clinic follow-up. She desired elective IVC filter retrieval.

RESULTS: On post-placement day 1731, the IVC filter was successfully removed via snare technique utilizing a 12-French sheath placed in the right internal jugular vein. A Reliant occlusion balloon (Medtronic, Minneapolis, MN, USA) was positioned in the inferior vena cava via right common femoral vein access for immediate tamponade in the event of IVC injury; a self expanding aortic covered stent endoprosthesis was available for placement if needed. Completion venography demonstrated no caval injury or contrast extravasation. Patient was discharged to home after the procedure and was in good health at routine follow-up 30 days later.

THURSDAY



CONCLUSIONS: Delayed removal of IVC filter is feasible with minimal morbidity, even after IVC erosion and retroperitoneal hematoma.

P24 Preoperative Lymph Mapping Together with Vein Mapping Is Useful to Prevent Postoperative Lymphorrhea in Paramalleolar Bypass in Patients with Critical Limb Ischemia

N. Unno, H. Tanaka, N. Yamamoto, M. Suzuki, H. Konno

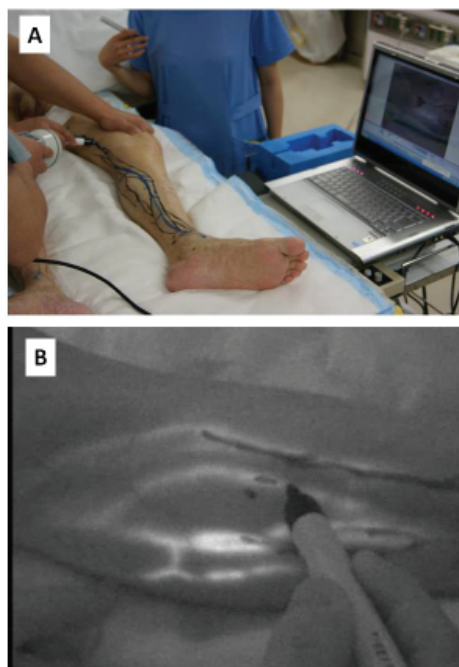
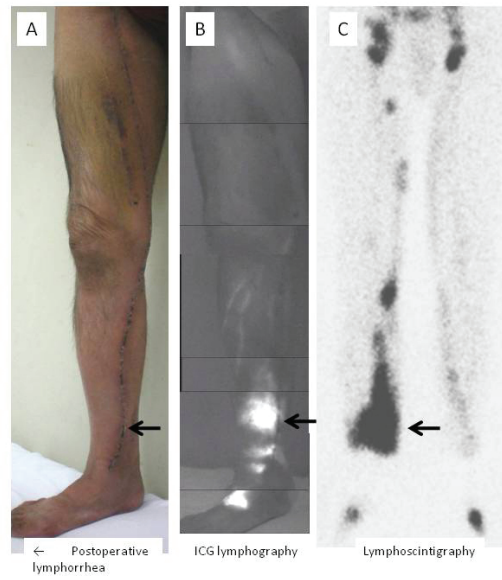
Hamamatsu University School of Medicine, Hamamatsu, Japan

BACKGROUND: Bypass surgery to the foot and ankle needs long incision to harvest great saphenous vein (GSV), which is often associated with postoperative wound lymphorrhea (Fig.1). To avoid the complication, we introduce our novel method of preoperative lymph and vein mapping before the vein harvest.

METHODS: Between February 2009 and May 2011, 13 consecutive patients with critical limb ischemia (CLI) were performed both vein mapping and lymph mapping before GSV harvest (Group A). Duplex vein mapping was performed to mark GSV running before the surgery. Lymph mapping was performed with indocyanine green (ICG) fluorescence lymphography, in which fluorescence images of lymph were obtained with an infrared-light camera system after subdermal injection of 0.3 ml of ICG (10% in normal saline). Distribution of subcutaneous lymph collector vessels was marked according to the real-time fluorescence lymphography (Fig 2). Paramalleolar bypasses (common femoral artery (CFA)-anterior tibial artery (ATA) bypass 3, CFA-posterior tibial artery (PTA) bypass 10) were performed using reversed GSV grafts in all cases. When GSV was harvested, skin incision, where the lymph collector vessels were running, was performed with careful ligation of subcutaneous tissue above GSV. Postoperative wound complication (particularly lymphorrhea), length of the postoperative hospital stay were compared to those in the previous ten consecutive CLI patients who underwent paramalleolar bypass (CFA-ATA bypass 2, CFA-PTA bypass 7, CFA-peroneal artery bypass 1) using a reversed GSV graft (Group B).

RESULTS: The occurrence of any level of lymphorrhea in the wound was 8/10 (80%) in Group B, while 2/12 (17%) in Group A ($p < 0.01$). The length of postoperative hospital stay was 31.7 ± 8.8 , 54.5 ± 38.9 days (Group A, Group B, respectively, $p < 0.05$).

CONCLUSIONS: Preoperative lymph and vein mappings for harvesting vein grafts are useful to avoid postoperative lymphorrhea and reduce the length of hospital stay.



Friday, February 10, 2012

7:00 am – 7:30 am

Continental Breakfast

7:30 am – 9:15 am

SCIENTIFIC SESSION 5
Chronic Venous Insufficiency

*Moderators: Thomas O'Donnell, MD
David Gillespie, MD*

Educational Objective: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Understand variables that affect healing of venous ulcers; 2) Become comfortable with initiatives to improve venous ulcer healing; 3) Recognize which patients will benefit from iliac vein stenting; 4) Understand what are the outcome following secondary intervention after endovenous ablation; 5) Learn what are the outcomes following iliac vein stenting.

7:30 am – 7:50 am 21

Variables Affecting Healing of Venous Leg Ulcers in a Randomized, Vehicle-Controlled Trial of Topical Cellular Therapy

W. Marston¹, R. Kirsner², R. Snyder³, T. Lee⁴,
I. Cargill⁴, H. Slade⁴

¹University of North Carolina, Chapel Hill, NC,

²University of Miami Leonard Miller School of Medicine, Miami, FL, ³Barry University School of Podiatric Medicine, Miami Shores, FL,

⁴Healthpoint Biotherapeutics, Ft. Worth, TX

BACKGROUND: HP802-247 is a cell based therapy under development for treatment of non-healing venous leg ulcers. The product consists of growth-arrested neonatal fibroblasts and keratinocytes, sprayed onto the wound surface in a self-assembling fibrin matrix. A Phase 2 efficacy trial involving 35 sites collected data on variables thought to influence response to treatment.

METHODS: 362 subjects were screened to enroll 228 into 5 intervention groups (low dose biweekly (N = 46), low dose weekly (N = 43), high dose biweekly (N = 44) high dose weekly (N = 45), or vehicle control (N = 50). Biweekly dosing alternated with application of sprayed matrix control to maintain blinding. Treatment plus 4-layer compression bandage was administered weekly for 12 weeks or until healed. Outcome measures included days to wound closure and proportion of wounds healed after 12 weeks of treatment.

FRIDAY

RESULTS: Cell treatment (all groups pooled) was superior to vehicle. Baseline wound area was significantly associated with days to wound closure ($P = 0.006$) but did not affect the proportion of wounds healed at 12 weeks in a multiple logistic regression model ($P = 0.12$). Variables influencing proportion healed in the model are listed below:

Variables Influencing Proportion Healed		
Variable	Range of Values	P value
Intervention	Cells vs Vehicle	0.004
Wound Duration	6 to 104 weeks	0.001
Wound Location	Lower calf vs other sites	0.008

As an independent variable outside the model, baseline bacterial counts ($>10,000$ cfu/gm) of *Escherichia*, *Enterobacter*, *Enterococcus*, *Morganella* and *Pseudomonas* species, or any β -hemolytic *Streptococcus*, reduced the probability of closure under either treatment ($P < 0.05$, Chi square). The effect on relative risk of failure (wound open) was more pronounced in the control group ($RR = 5.4$) than the cell treated group ($RR = 1.4$). No subject who developed a clinically evident wound infection closed their wound within 12 weeks. Variables found to have no influence under the conditions of this study included debridement, hemoglobin A1C, hemoglobin, serum creatinine, prealbumin, albumin, peripheral neuropathy, and body weight.

CONCLUSIONS: In this study, the variables influencing healing were initial wound size, wound duration, wound location, and the addition of cellular therapy to standard compression. The presence of certain bacteria in the wound at screening inhibited healing, while an episode of infection prevented healing within the 12 week study time frame. This information may be used to predict healing potential of an ulcer at baseline, and in the design of future intervention trials.

7:50 am – 8:10 am 22 **Venous Ulcers' Prevalence Study in Olmsted County—to Measure the Success of the Venous Ulcer Initiative**

M. L. Gloviczki¹, H. Kalsi², J. Heit², The AVF Ulcer Initiative Committee members:

E. Cummings, B. Eklof, D. Gillespie, M. Gloviczki, P. Henke, R. Kistner, F. Lurie, W. Marston, T. O'Donnell, M. Passman, L. Pounds, T. Wakefield

¹American Venous Forum, Rochester, MN,

²Mayo Clinic, Rochester, MN

BACKGROUND: Pacific Vascular Symposium VI and American Venous Forum (AVF) issued a call to reduce venous ulcers by 50% in ten years. A series of recommendations were formulated. To measure the success of the venous ulcer initiative, the ulcer prevalence has to be evaluated. The Olmsted County in Minnesota offers in this regard an exceptional opportunity: practically whole population is included in the Rochester Epidemiological Project.

METHODS: Preliminary data for the ulcer prevalence study was obtained using 11 ICD-9 codes related to venous ulcer diagnosis and treatment (454.0–2, 459.11–13, 459.31, 459.33, 459.81 and 707.9–10). The number of venous ulcer cases per year was established from year 1991 to 2010. Each patient was notified only once.

Further study will focus on patients from two last years. The review of the medical charts will be performed to confirm the venous origin of ulcers. The calculated prevalence will be extrapolated to the whole American population taking into consideration demographic structure of the Olmsted County and the entire country.

The study will be repeated after ten years period to measure the impact of the Ulcer Initiative actions.

RESULTS: Between 1991 and 2009/2010 the estimated prevalence of venous ulcer per year varied from 0.26% to 1.48% (see Figure 1). In the same time the population of the county increased considerably (106,966 in 1990 and 144,248 in 2010). The median age rose from 29 to 34 years for men and from 31 to 36 for women.

FRIDAY

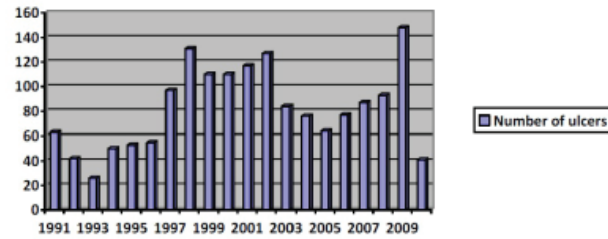


Figure 1: Number of ulcers in Olmsted County from 1991 to 2010

CONCLUSIONS: In this preliminary data the estimated prevalence of venous ulcers in Olmsted County had some fluctuations between 1991 and 2009/2010 with concomitant increase in the median age of the population. Further study with the review of medical charts will establish the exact current incidence and prevalence and will constitute the basis for global estimation of the ulcer prevalence in the USA.

8:10 am – 8:30 am 23 **Long-Term Outcomes of Endovascular Intervention for May-Thurner Syndrome**

E. S. Hager¹, R. Tahara², E. Dillavou¹,
G. Al-Khoury¹, T. Yuo¹, R. Rhee¹, L. Marone¹,
M. Makaroun¹, R. A. Chaer¹

¹University of Pittsburgh Medical Center,
Pittsburgh, PA, ²Bradford Regional Medical
Center, Bradford, PA

BACKGROUND: Endovascular interventions for May Thurner Syndrome (MTS) have become first line therapy, often performed in a young patient population despite the lack of robust supportive data. This paper reports on long term outcomes from a large series of patients treated for de-novo or postthrombotic presentation.

METHODS: A retrospective review of MTS patients stented between 2006 and 2010 at two institutions. Patients who presented with acute iliofemoral DVT were treated with either catheter directed thrombolysis (CDT) and/or pharmacomechanical thrombolysis (PMT) and identified as having a venous stenosis by venogram. Patients who presented with leg pain or swelling but no DVT and evidence of MTS on duplex were evaluated by venography. IVUS was selectively utilized. Stenting of the ilio caval junction was performed in all patients with a >50% diameter stenosis on venogram, or a >70% area stenosis on IVUS.

RESULTS: 51 patients with MTS underwent 53 lower extremity interventions. They were divided into two groups: post-thrombotic (Group 1) and de-novo presentation of swelling/pain but no DVT (group 2). There were 38 extremities in group 1 and 15 extremities in group 2 (Table). Both groups were comparable in terms of gender distribution and comorbidities, but hypercoagulable state was more common in group 1 ($p = 0.04$), and average CEAP score on presentation was higher in group 2 ($p = 0.05$). There were left sided symptoms in 34 (89%) patients in group 1 and 10 (77%) of group 2 ($p = 0.26$). Males represent 75% of patients with right sided symptoms, but only 30% of patients with left sided symptoms ($p = 0.019$). The average stent size was significantly different among the groups, ($p < 0.001$), with different types used in each group. (Table). There were no procedural complications in either group. Mean follow-up was 15 months in group 1 (range 1–42 months) and 11 months in group 2 (1–24 months). Complete or partial symptom relief was reported for 31 (89%) extremities in group 1 and 15 (100%) extremities in group 2 ($p = 0.17$). A normal Valsalva response was seen in all patients with a patent stent on the most recent follow up duplex, with an overall primary patency at 3 years by lifetable analysis of 96% (94% in group 1, 100% in group 2) and secondary patency of 98%.

FRIDAY

Table: Patient Characteristics and Procedure Analysis			
	Stenting After PMT/CDT (Post Thrombotic) N = 38(%)	Stenting Alone (De Novo Presentation) N = 15(%)	p Value
Females	23 (61%)	11 (73%)	0.38
Average Age	52 (range 16–80 years)	55 (range 25–67 years)	0.60
Hypercoagulable State	9 (24%)	0	0.04
Coronary Artery Disease	6 (16%)	1 (7%)	0.38
Diabetes	4 (11%)	4 (27%)	0.14
Hyperlipidemia	13 (34%)	3 (20%)	0.31
Hypertension	17 (45%)	7 (47%)	0.90
Left Side	34 (89%)	11 (73%)	0.14
Average Pre-operative CEAP score	2.7	3.8	0.05
Number of Patients Wearing Compression Stockings Pre-Operatively	16 (42%)	15 (100%)	<0.01
Average Stent Size (mm)	14 mm (range 10–22)	17 mm (range 12–22)	<0.01
IVUS Use	19 (51%)	12 (80%)	0.04
Stent Type			0.01
— Balloon Expandable	7 (18%)	8 (53%)	
— Self expanding	31 (82%)	7 (47%)	
o Protégé (EV3)	28 (90%)	4 (57%)	
o Wallstent (Boston Sci)	3 (10%)	3 (43%)	
Bleeding Complications	0	0	N/A
Mean length of follow-up	15 months	11 months	
Complete or Partial symptom relief	31 (89%)	15 (100%)	0.17
Change in CEAP Score at Follow-Up	−0.16 (p = 0.81)	−0.27 (p = 0.04)	

CONCLUSION: Stenting of MTS has proven to be safe, efficacious and durable for up to 36 months in both the post thrombotic patient as well as those treated for edema alone.

8:30 am – 8:50 am 24 **Outcomes and Predictors of Secondary Intervention for Chronic Venous Insufficiency Following Endovenous Radiofrequency Ablation**

K. R. Diamond, M. S. Hong, D. Shelpman,
P. R. Nelson

*University of Florida College of Medicine,
Gainesville, FL*

BACKGROUND: Endovenous ablation for the treatment of chronic venous insufficiency (CVI) affords patients a minimally invasive treatment alternative to traditional surgical procedures. Endovenous ablation is highly technically and clinically successful such that only a minority of patients may require subsequent treatment for either extensive varicosities or for veins in which ablation was unsuccessful. The purpose of this study was to develop a predictive model to forecast this requirement for secondary procedures despite successful primary endovenous radiofrequency ablation (RFA) for CVI.

METHODS: Subjects were identified from a University Vein Center database and assigned to one of two groups: (1) Control: patients whose RFA was successful as a primary standalone procedure in alleviating symptoms and decompressing varicosities, or (2) Reintervention: patients who required additional treatment to correct their disease after initial RFA did not provide a complete clinical response. For patients who had bilateral RFA, each limb was identified independently for both the primary and secondary procedures. Secondary procedures were defined as phlebectomy, vein stripping, sapheno-femoral junction (SFJ) ligation, or radiofrequency ablation of the same vein or additional accessory veins. Patients who were treated exclusively with sclerotherapy as a secondary intervention were excluded. Data was analyzed using sequential univariate and multivariate regressions along with Chi-square goodness of fit.

RESULTS: Of the 185 patients included in this study, 32 patients required a secondary intervention (17.3%). Secondary procedures included phlebectomy 53%, secondary RFA 28%, combined RFA and phlebectomy 6%, SFJ ligation 6%, and vein stripping 3%. The mean Venous Clinical Severity Scores (VCSS) for the control and reintervention groups were 4.8 and 6.7, respectively ($p = 0.001$). The overall median VCSS was 5 (range 2–17). For subjects with a VCSS > 5 , the requirement for secondary procedures was 10-fold greater. Univariate regression suggested that BMI, diabetes, pain, varicosities, edema, pigmentation, induration, compression, and total VCSS contributed to the need for secondary intervention at the $p < .1$ level. Multivariate regression modeling these covariates showed independent predictive association between increasing total VCSS and secondary intervention ($p = .0001$), and an inverse association between increasing BMI and a decreased risk of reintervention following RFA ($p = .008$).

FRIDAY

CONCLUSIONS: Secondary procedures were required only in 17% of patients following RFA, so for most, a staged approach to any secondary procedures may be appropriate. With the knowledge gained from this study, clinicians may be able to better individualize patient treatment by identifying those at up front greater risk of requiring a secondary procedure. For this subset, providing comprehensive treatment, such as a combination of RFA with SFJ ligation or phlebectomy, could mitigate the risks of additional surgical procedures.

8:50 am – 9:10 am

EUROPEAN VENOUS FORUM—BEST PAPER 1

Endovenous Laser Treatment of the Great Saphenous Vein Using a Bare Fibre Versus Tulip Fibre—Short Term Results of the Tulip-Trial (ISRNTN51287398)

Y. Goubau¹, P. Mahieu¹, M. Vuylsteke¹, S. Thomis², I. Fournau², S. Mordon³

¹Department of Vascular Surgery, Sint-Andriesziekenhuis Tielt, Belgium, ²Department of Vascular Surgery, Universitair Ziekenhuis Gasthuisberg, Leuven, Belgium, ³INSERM U 703, Université Lille Nord de France, CHRU Lille France

9:15 am – 9:45 am

Coffee Break

9:45 am – 11:45 am

SCIENTIFIC SESSION 6

President's Session

Moderators: Seshadri Raju, MD
Robert McLafferty, MD

9:45 am – 10:00 am

2011 Servier Traveling Fellowship Reports 2 Winners Provide Update of EVF Meeting Experience

10:00 am – 10:15 am

2011 BSN Jobst Research Winner—Interim Report

10:15 am – 10:20 am

American Venous Registry Update

10:20 am – 10:25 am

National Venous Screening Update

10:30 am – 10:45 am

Presidential Address Introduction

Introduction By: Robert McLafferty MD,
President-Elect

10:45 am – 11:30 am

PRESIDENTIAL ADDRESS

Keeping an Open Mind—Three Different Ways

Seshadri Raju, MD

11:30 am – 12:30 pm

MEMBER BUSINESS LUNCHEON

FRIDAY

1:00 pm – 5:30 pm

SPECIALTY SYMPOSIA

(CONCURRENT)

(Limited Seating—Registration Required)

1:00 pm – 3:00 pm

**(A) VASCULAR MEDICINE &
THROMBOSIS**

*Chairs: Susan Kahn, MD
Thomas Wakefield, MD*

*Panelists: Jawed Fareed, MD
Timothy Liem, MD*

Educational Objective: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Understand some of the new pathophysiological aspects of venous thrombogenesis; 2) Obtain an appreciation of the role of thrombus removal for prevention of complications of iliofemoral venous thrombosis; 3) Learn about the new oral anticoagulants for the treatment of VTE; 5) Appreciate the natural history of chronic venous insufficiency.

**New Anticoagulants for the
Treatment of VTE**

Jeff Weitz, MD

**The Role of Aggressive Treatments for
Ilioferomoral Venous Thrombosis**

Anthony Comerota, MD

**Treatment of Superficial Vein
Thrombosis**

Paolo Prandoni, MD

**Venous Thromboembolism: The
Convergence of Inflammation and
Thrombosis**

Thomas Wakefield, MD

**Mechanism and Management of Post-
Thrombotic Syndrome After DVT**

Susan Kahn, MD

Panel Discussion

1:00 pm – 5:30 pm

**(B) BIOMECHANICS &
BIOENGINEERING**

Chairs: Roger Kamm, MD
Geert Schmid-Schonbein, MD

Educational Objective: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Understand some biomechanical aspects of venous physiology and pathophysiology of venous diseases; 2) Obtain an appreciation of the role of biomechanical research for addressing gaps in knowledge in venous pathophysiology; 3) Learn about the bioengineering solutions for the management of venous disorders.

**Unresolved Hemodynamic Issues in
Clinical Venous Disease**

Seshadri Raju, MD

**In Vitro Methods and Micro-Fluidics:
Their Potential for Studies in Venous
Disease**

Roger Kamm, MD

**Status of the Analysis of Inflammatory
Trigger Mechanisms in Chronic
Venous Disease**

Geert Schmid-Schonbein, MD

**Venous Valve and Venous Circulation:
Myths, Misconceptions and Questions
for Biomechanics**

Fedor Lurie, MD

**Experimental and Numerical
Assessment of Venous Valve Model
Under High Flow Rates**

Andrew Narracott, MD

**Comments on the Design of a
Working Artificial Vein Valve**

David Ku, MD

**Biomechanical Modeling Challenges
in Venous and Lymphatic Vessels**

James More, MD

FRIDAY

1:00 pm – 5:30 pm

(C) WOUND CARE & COMPRESSION

Chairs: William Marston, MD
Hugo Partsch, MD

Educational Objective: At the conclusion of this session the participant/ attendee/learner should be able to: Learn of current emerging information related to the treatment of venous leg ulcers will be presented with information including the optimization of compression to maximize wound healing, the role of inflammation in the etiology and chronicity of venous ulcers and the use of adjunctive therapies to accelerate wound healing.

**Inflammation and the Cause of
Ulceration in Patients with Venous
Hypertension**

Robert Kirsner, MD

**Optimal Modalities of Compression to
Maximize Healing Potential of Venous
Leg Ulcers**

Hugo Partsch, MD

PANEL DISCUSSION

2:30 pm – 3:00 pm

Break

**Adjunctive Strategies for the Healing
of Venous Leg Ulcers**

William Ennis, MD

**Venous Leg Ulcers: What Do You
Actually Do with Patients in the Clinic
Today?**

William Marston, MD

CASE PRESENTATIONS

3:00 pm – 3:30 pm

Coffee Break

3:30 pm – 5:30 pm

(D) LIVE VENOUS ULTRASOUND

Chair: Nicos Labropoulos, PhD

Educational Objective: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Identify the main deep veins from the diaphragm to the inguinal ligament; 2) Detect compression of the veins such as in cases of Nutcracker or iliac vein compression syndromes; 3) Identify the ovarian veins and internal iliac veins using different testing maneuvers to detect reflux.

Saturday, February 11, 2012

7:00 am – 8:00 am

Continental Breakfast

8:00 am – 10:00 am

SCIENTIFIC SESSION 7
Chronic Venous Disease

*Moderators: Antonios Gasparis, MD
Cees Wittens, MD*

Educational Objectives: At the conclusion of this session the participant/ attendee/learner should be able to: 1) Understand diagnostic algorithm for diagnosis of DVT; 2) Identify risk factors for development of DVT; 3) Recognize patient risk factors for development of DVT; 4) Understand measures to prevent post thrombotic syndrome; 5) Identify patients with pulmonary embolism who are candidates for thrombolysis.

8:00 am – 8:20 am

25

Soluble P-Selectin for the Diagnosis of Lower Extremity Deep Venous Thrombosis

F. C. Vandy¹, C. Stabler¹, A. E. Hawley¹,
N. Ballard-Lipka¹, K. E. Guire², N. Baker¹,
D. D. Myers¹, J. E. Rectenwald¹, P. K. Henke¹,
T. W. Wakefield¹

¹University of Michigan, Ann Arbor, MI,

²Department of Biostatistics, School of Public Health, University of Michigan, Ann Arbor, MI

BACKGROUND: Although duplex ultrasound is the gold standard for the diagnosis of lower extremity deep venous thrombosis (LE-DVT), imaging is not always available. The use of D-dimer can exclude (high sensitivity), but not rule in (low specificity) LE-DVT. In a derivation cohort, we previously demonstrated that soluble P-selectin (sPsel) with Wells score, establishes the diagnosis of LE-DVT with specificity of 96% and positive predictive value (PPV) of 100%. In order to validate our previous results, we applied the model from our derivation cohort to a separate but similar validation cohort, differing by allowing inclusion of patients on immunosuppression or prophylactic anticoagulation.

METHODS: Demographics, clinical data, D-dimer, sPsel, C-reactive protein (CRP), ADAMTS-13, and von Willebrand factor (vWF) levels were prospectively collected in 160 patients presenting to our ultrasound lab with an anticipated diagnosis of LE-DVT. Continuous (Students t-test) and categorical (Chi squared test) variables among patients with ultrasound confirmed LE-DVT were

SATURDAY

compared to patients without LE-DVT. The diagnostic sensitivity, specificity, PPV and negative predictive value (NPV) was then calculated using cut points from our derivation cohort to rule in LE-DVT (sPsel ≥ 90 ng/mL or D-dimer ≥ 500 ng/mL and Wells score ≥ 2) as well as exclude LE-DVT (sPsel < 60 ng/mL or D-dimer < 500 ng/mL and Wells score < 2).

RESULTS: 80/160 patients had a confirmed LE-DVT. There was a significant difference in all biomarkers among those patients with LE-DVT. (Table 1) When Wells score ≥ 2 , sPsel could rule LE-DVT with a specificity of 96% and a PPV of 89%, which was more accurate than Wells score ≥ 2 and D-dimer (specificity 65% and PPV 71%). (Table 2) When Wells score was < 2 , D-dimer was superior to sPsel for excluding the diagnosis of LE-DVT (sensitivity 100%, NPV 100% vs. sensitivity 90%, NPV 77%). The use of additional biomarkers did not increase the specificity/sensitivity for diagnosing LE-DVT. Using a combination of Wells score, D-dimer, and sPsel we could correctly diagnose LE-DVT in 27% (43/160) of patients without the use of imaging.

Table 1: Demographics and Biomarkers			
Variable	Negative LEDVT (95% Confidence Intervals)	Positive LEDVT (95% Confidence Intervals)	p Value
Female Gender n (%)	53 (66%)	34 (43%)	0.002
Age	53.2 years (50.2–56.1)	57.6 years (54.4–60.7)	0.046
Wells Score	1.6 (1.4–1.8)	3.0 (2.6–3.3)	< 0.001
D-Dimer (ng/mL)	986.4 ng/mL (756.5–1216.3)	6268.4 ng/mL (5356.1–7180.7)	< 0.001
sPsel (ng/mL)	57.2 ng/mL (50.8–63.6)	78.4 ng/mL (70.8–85.9)	< 0.001
CRP (μ g/mL)	1.34 μ g/mL (0.65–2.03)	5.74 μ g/mL (4.22–7.25)	< 0.001
vWF (% activity)	113.3% (95.3–131.3)	151.7% (134.6–168.8)	0.002
ADAMTS-13 (% activity)	102% (97–106)	91% (86–95)	< 0.001

Table 2: Specificity, Sensitivity, Positive Predictive Value, Negative Predictive Value

Biomarker	Specificity (95% Confidence Interval)	Sensitivity (95% Confidence Interval)	Positive Predictive Value	Negative Predictive Value
sPsel (≥ 90 ng/mL) + Wells score (≥ 2)	96% (88.7–99%)	31% (21.6–42.7%)	89%	58%
D-dimer (≥ 500 ng/mL) + Wells score (≥ 2)	65% (53.4–75.1%)	84% (73.4–90.7%)	71%	80%
sPsel (< 60 ng/mL) + Wells score (< 2)	34% (23.8–45.3%)	90% (80.7–95.3)	58%	77%
D-dimer (< 50 ng/mL) + Wells score (< 2)	32% (22.7 –44%)	100% (94.3 –100%)	60%	100%

CONCLUSIONS: In validating our previous study, we have demonstrated, in the setting of Wells score ≥ 2 , sPsel is an excellent biomarker rule in LE-DVT. Different from our derivation cohort, D-dimer and a Wells score < 2 was more sensitive at excluding a diagnosis of LEDVT than sPsel and a Wells score < 2 . Together, Wells score, sPsel, and D-dimer can both rule in and exclude LE-DVT.

8:20 am – 8:40 am 26 **Deep Venous Thrombosis After
Abdominal Aneurysm Repair**

E. Xenos, D. Davenport
*University of Kentucky Medical Center,
Lexington, KY*

OBJECTIVE: Thromboprophylaxis guidelines after abdominal aortic aneurysm repair are scarce. The objective of this study was to examine venous thromboembolism (VTE) rates, timing and risk factors after non-ruptured open or endoluminal (ELG) Abdominal Aortic Aneurysm repair.

METHODS: A systematic study of patients undergoing AAA repair was performed. We queried the ACS NSQIP dataset from 2005–2009 for AAA repairs using [CPT] © and [ICD-9] codes. We excluded emergent /ruptured AAA operations. Forward stepwise multivariable logistic regression of all 30-day VTE was performed.

RESULTS: Our query yielded 12469 patients. The mean age was 73.2 ± 8.7 (s.d.) years and 2466 (19.8%) were female. The DVT rate within 30 days of operation was 0.9% (n = 106) and the PE rate was 0.3% (n = 36). Diagnosis of both was rare (n = 7) and the combined DVT or PE rate (VTE) was 1.1% (n = 135). Thirty-day mortality was 1.9% (238/12469) and VTE was associated with increased 30-day mortality from 1.9% (232/12102) in patients without VTE to 4.4% (6/135) in patients with VTE (Chi-square p = .035). Thirty-percent (40/135) of treated VTEs were diagnosed after surgical discharge. The median postoperative days to VTE diagnosis was 8 (interquartile range 4 to 15 days).

Multivariable forward stepwise logistic regression yielded only four independent ACS NSQIP preoperative predictors of VTE. They are shown in Table I by their order of entry into the model (and therefore importance). This is after consideration of over fifty clinical risk variables. Intraoperative risk factors are shown in Table II. After adjustment, open repair had higher risk for VTE (O.R. 1.46, 95% C.I. 0.93–2.30) but this was no longer statistically significant, p = .104.

Risk factors identified were ASA class 4–5 (odds ratio [OR] 1.77, p = 0.002), operative duration >4 hrs (OR 2.33, p = 0.14) and intraoperative blood transfusion. Operative duration and transfusion were both risk factors and increased with increasing “dose”.

Table I:					
Step	Variable	Incidence	%	Odds Ratio (95% C.I.)	P-Value
1	ASA Class 4–5 vs. 1–3	2480	19.9	1.77 (1.22–2.55)	.002
2	Dyspnea	3049	24.5	1.68 (1.17–2.39)	.005
3	Race vs. white	10696	85.8	Reference	
	Black	467	3.7	2.21 (1.18–4.15)	.013
	Other/Unknown	1306	10.5	0.93 (0.51–1.70)	.820
4	Recent weight loss >10%	2318	18.6	2.31 (1.00–5.32)	.050

Table II:				
Variable	Incidence	%	Odds Ratio for VTE (95% C.I.)	P-Value
Open vs. Endovascular Repair	3967	31.8	1.46 (0.93–2.30)	.104
Intraoperative transfusion PRBCs vs. None	8551	68.6	Reference	
1–2 U	2200	17.6	1.23 (0.73–2.08)	.430
3–4 U	978	7.8	1.48 (0.79–2.79)	.221
5+ U	740	5.9	2.39 (1.27–4.48)	.007
Operative Duration vs ≤2 hrs.	3133	25.1	Reference	
2.01–3 hrs.	4350	34.9	1.78 (0.95–3.28)	.070
3.01–4 hrs.	2586	20.7	1.70 (0.87–3.35)	.123
>4 hrs.	2400	19.2	2.33 (1.18–4.59)	.014
Wound Class Not Clean	320	2.6	2.01 (1.03–3.94)	.041

DISCUSSION: Although VTE after AAA repair was infrequent, it was associated with higher mortality. Open AAA repair increases risk for postoperative VTE as compared to ELG. It was surprising to find that 1/3 of VTE's were diagnosed after discharge. Patients with the aforementioned risk factors may benefit from pharmacologic thromboprophylaxis after AAA repair. Pharmacologic thromboprophylaxis may not be necessary after ELG.

SATURDAY

8:40 am – 9:00 am 27 **Thrombolytic Therapy for Significant Pulmonary Emboli**

G. Purdy¹, H. McKeever², T. Khoury³

¹Shawnee State University, Portsmouth, OH, ²Ohio University College of Osteopathic Medicine, Athens, OH, ³Southern Ohio Surgical Associates, Portsmouth, OH

BACKGROUND: This study is a retrospective review of the treatment of patients with significant pulmonary emboli (PE) with thrombolytic therapy in a rural setting hospital. Significant PE is defined as a patient with hypoxemia \pm right ventricular strain \pm hemodynamic compromise. Long-term studies with emphasis on recurrent deep vein thrombosis was assessed as well. Patients studied were in the interval of 2000–2010. Records prior to 2000 were not available.

METHODS: To review initial thrombolytic therapy, operative reports were interpreted and evaluated to determine therapy implemented, and if complete or partial lysis of emboli was achieved. For long-term studies annual venous duplexes were assessed.

RESULTS: Records from 2000–2010 showed that 51 patients were treated with thrombolytic therapy. Of those patients 7 received Urokinase (drip ranges between 100,000–200,000 units/hour), 44 received TPA (drip ranges between 0.5–2 mg/hour). The majority of patients were dripped via the Unifuse catheter; recently the EKOS catheter has been implemented upon which 9 out of 51 patients received. Thirty-five out of 51 patients received vena cava filters. Three patients received mechanical lysis with the Angiojet Device. All patients were on a heparin drip protocol systematically while on lytic therapy. The average drip duration for treatment ranged between 12 hours and 24 hours. The average drip duration for TPA was 24.23 hours for bilateral treatment with a standard deviation of \pm 21.68 hours. The average for Urokinase was 16.57 hours with a standard deviation of \pm 4.47 hours. Patients who received TPA and EKOS adjunct averaged 14.44 hours. The study showed no procedural mortalities and no deaths at 30 days prior to therapy. Fifty-three percent of patients had complete lysis, 47% had substantial partial lysis with freedom from supplemental oxygen. All patients improved hemodynamically. Twelve out of 51 patients required a blood product during their hospitalization. Nine patients required PRBC, 2 FFP, and 1 with CryoPPT. There were no GI bleeds or retroperitoneal hematomas. Long-term follow-up to 4 years showed 70% venous reflux in the common femoral vein. Less than 20% of patients experienced a low incidence of recurrent deep vein thrombosis while on anti-coagulants.

CONCLUSIONS: In conclusion, aggressive thrombolysis in significant PE is safe with substantial results within 24 hours of therapy and rapid improvement in symptoms over a short duration of therapy.

9:00 am – 9:20 am 28

A Therapeutic Education Program for the Prevention of the Post-Thrombotic Syndrome

P. H. Carpentier¹, B. Satger¹, M. Barrellier²,
C. Menez¹, J. Kubina³, B. Sandrin-Berthon⁴

¹Grenoble University Hospital, Grenoble, France,

²Caen University Hospital, Caen, France, ³La

Roche sur Yon Hospital, La Roche sur Yon,

France, ⁴Centre Regional d'Education pour la

Sante Languedoc Roussillon, Montpellier, France

BACKGROUND: The post-thrombotic syndrome account for approximately one half of advanced chronic insufficiency, and its incidence is related to the severity of the thrombotic event and the quality of the treatment in the acute phase, but also influenced by the behavior and lifestyle of the patient (physical activity, weight control and compliance to elastic stockings^{1/4}). The aim of therapeutic education is to help the patient to achieve the required changes in lifestyle and health related behaviors by improving his knowledge, skills and motivation, which seem appropriate in patients with high risk of post-thrombotic syndrome. We developed and performed a preliminary evaluation of a structured therapeutic education program dedicated to the patients with a recent episode of proximal deep vein thrombosis.

METHODS: The education program is organized as a six days course for small groups of 6 to 10 patients who benefit from, one individual educative consultation, four group education workshops and six sessions of active balneotherapy, also aiming at educational objectives. Three training courses were organized in three different spa resorts specifically dedicated to the care of patients with venous diseases (La Léchère, Rochefort et Bagnoles de l'Orne). Main inclusion criteria were a recent (<2 years) proximal DVT of the lower limbs remaining symptomatic but with no skin changes (C0s–C3), availability for the course and written consent. An evaluation of CIVIQ2 quality of life scale (autoevaluation), and VCSS and Villalta score (by an independent observer) was performed at inclusion, and at 2 and 6 months follow-up.

RESULTS: Twelve women and nine (median age 58 years; 20–89) were enrolled. No dropout was observed during follow-up. Every participant declared a high level of satisfaction level. Two and six months follow-up showed a significant improvement of the CIVIQ2 quality of life scale ($P < 0.01$), the VCSS ($P < 0.05$) and the Villalta score ($P < 0.01$).

CONCLUSION: This promising results have to be confirmed in a larger scale randomized controlled study with longer follow-up, which has just started.

Work supported by a grant of the Association Française pour la Recherche Thermale (#2009–02).

SATURDAY

9:20 am – 9:40 am 29 **Ultrasound Accelerated Catheter Directed Thrombolysis in Patients with Acute Iliofemoral Deep Vein Thrombosis and in Stent Thrombosis: Clinical Experience**

R. H. W. Strijkers¹, J. Grommes²,
A. J. Ten Cate¹, H. Ten Cate¹, C. H. A. Wittens¹

¹Maastricht University Medical Center, Maastricht, Netherlands, ²University Hospital RWTH Aachen, Aachen, Germany

BACKGROUND: Iliofemoral Deep Vein Thrombosis (IFDVT) is associated with a high incidence of the post thrombotic syndrome. The current CHEST guidelines suggest that catheter directed thrombolysis can be used for patients with acute IFDVT and severe leg complaints. Current literature shows that catheter directed thrombolysis increases patency of the affected tract and may reduced post thrombotic complications, but treatment time and complications are high. Ultrasounds Accelerated Catheter Directed Thrombolysis (UACDT) uses ultrasound waves to enhance clot lysis, which in turn should lower treatment time and bleeding complications with the same or higher patency rates. We report our clinical experience with UACDT in patients with acute IFDVT.

METHODS: Patients who were treated with UACDT for acute IFDVT were included in our analysis. Diagnosis of IFDVT was confirmed using duplex sonography and MR-venography. In addition to the thrombolysis, stents were placed or AV-fistula created to ensure patency of the treated vein, if indicated. Main outcome is patency after one year. Secondary outcome measures are: treatment time, bleeding complications, and pulmonary embolism. Patency was assessed using duplex sonography.

RESULTS: In total 38 patients (average age at intervention 42 years, range 5–78 years) were included. They underwent 45 UACDT procedures. The DVT location was unilateral in 35 patients (23 left side, 12 right) and 3 times bilateral. Average treatment time was 64 hours (range 20–166 hours), success rate of thrombolysis was 91% (n = 41), re-thrombosis occurred after 14 (31%) procedures. Additional procedures were required in 50% (n = 19) of patients. These additional procedures included PTA and stenting of the venous tract and 6 open procedures. 4 patients received the UACDT twice and 2 patients received UACDT three times because of recurrent thrombosis or stent thrombosis. Average follow-up time was 14 months (maximum 31 month, median 12 months). Major bleeding occurred in two patients (4%) and four minor bleedings occurred at the insertion point of the catheter (9%). One pulmonary embolism was encountered. Two patients had fever with positive blood cultures for *S. aureus*. Primary patency was 60%

(23/38); primary assisted patency was equal. Secondary patency was 74% (28/38) after an average of 12 months follow-up. In ten of twelve cases (83%) the first re-thrombosis of the treated leg occurred within the first two weeks after successful catheter-directed thrombolysis.

CONCLUSIONS: Ultrasound accelerated catheter directed thrombolysis of acute iliofemoral DVT seems feasible and safe. Supplementary angioplasty and stenting plays an important role in preventing rethrombosis.

SATURDAY

9:40 am – 9:55 am

**EUROPEAN VENOUS FORUM—BEST
PAPER 2**

**Endogenous Markers of Thrombogenesis
Are Significantly Increased in Patients
with Varicose Veins**

C. R. Lattimer, E. Kalodiki, D. Hoppensteadt,
Z. Chaudhry, J. Fareed, AN Nicolaides,
G. Geroulakos

*Josef Pflug Vascular Unit, Ealing Hospital and
Imperial College, London, UK; Thrombosis
& Haemostasis Research Laboratory, Loyola
University Medical Centre, Maywood, IL, USA;
Department of Biomedical Sciences, University
of Cyprus, Nicosia, Cyprus*

10:00 – 10:30 am

Coffee Break

10:40 am – 11:30 am

**D. EUGENE STRANDNESS MEMORIAL
LECTURE**

**Venous and Arterial Thrombosis: Is
There a Link?**

Paolo Pandoni, MD, PhD

*Chair, Internal Medicine, University of
Padova, Padova, Italy*

Introduction By: Seshadri Raju, MD

11:30 am – 1:00 pm

Lunch on Own

1:00 pm – 3:00 PM

SCIENTIFIC SESSION 8
Deep Vein Thrombosis 2

Moderators: Peter Pappas, MD
Robert McLafferty, MD

1:00 pm – 1:20 pm 30

Chronic Venous Insufficiency from an
Internist's Perspective: Results of the
Pri-Med Questionnaire

J. Heller
Johns Hopkins, Baltimore, MD

BACKGROUND: The purpose of this study was to gain insight into diagnostic and treatment patterns of venous disease among internal medicine practitioners.

METHODS: IRB approval was granted. An eleven question survey was distributed at the August 2011 Pri-Med Conference in Baltimore, Maryland.

RESULTS: 305 questionnaires were returned complete. The geographic representation likely reflected the location of the conference: 50% Mid Atlantic, 37% New England, and the remainder in the South, MidWest and West. The majority of participants (86%) practiced in a community setting. Of the respondents, 91% were physicians and 9% were advanced level practitioners. Only 3% of practitioners did not encounter venous disease; 93% prescribed compression stockings. When asked about the next treatment step in a patient with normal pedal pulses and a medial malleolar ulcer, 29% would obtain ankle brachial indices and 24% would begin wound care in their office. Heterogenous referral patterns were reported. Practitioners referred to more than a single type of vein specialist. Although 76% referred to a vascular surgeon, 23% referred to a free standing vein clinic, 9% radiologist, 3% cardiologist. Further, 34.6% responded that they met resistance to treat when referring venous disease to their vascular surgery colleagues. 84% would attend a one day course on venous disease.

CONCLUSIONS: Although venous disease is commonly seen in the medical practitioner's office, diagnostic aptitude is varied at best. Referral patterns to vascular surgeons are not routine. The vast majority of physicians are interested in further education. Further grassroots education is required to improve diagnosis and treatment in patients with chronic venous disease. This could lead to earlier intervention thereby decreasing the incidence of venous stasis ulceration in the United States.

SATURDAY

1:20 pm – 1:40 pm 31 **Is There a Relationship Between Increased Body Mass Index and Primary Venous Disease Severity and Concomitant Primary Deep Venous Reflux?**

J. T. Christenson, L. Vines, G. Gemayel
University Hospital of Geneva, Faculty of Medicine, University of Geneva, Geneva, Switzerland

BACKGROUND: The role of overweight in chronic venous disease is still controversial. The aim of this study was to evaluate the impact of overweight and obesity in chronic primary venous disease in relation to disease severity, using the CEAP and VCSS as well as bodyweight on the presence of concomitant primary deep venous reflux.

METHODS: Between October 2005 and September 2010, 1445 consecutive patients (2023 limbs) presenting with duplex-ultrasound confirmed chronic primary venous disease and planned for intervention were evaluated retrospectively from a prospectively collected database. The patients were classified according to CEAP classification, the venous clinical severity score (VCSS) and body mass index (kg/m^2), using the WHO definition. Concomitant primary deep venous reflux was evaluated and reexamined following eradication of the superficial reflux.

RESULTS: There were 636 normal weight patients (890 limbs), BMI <25 , 526 overweight patients (740 limbs), BMI 25 to 29.9, and 283 obese patients (393 limbs), BMI $\geq 30 \text{ kg}/\text{m}^2$. Overweight patients had more incompetent perforators ($p < 0.001$), hypertension ($p < 0.001$) and diabetes ($p = 0.019$) than normal weight patients and higher C-class and VCSS ($p < 0.001$). Obese patients had more incompetent perforators ($p < 0.001$), hypertension ($p < 0.001$), diabetes ($p = 0.004$) and primary deep insufficiency ($p < 0.001$) than overweight patients as well as higher C-class and VCSS ($p < 0.001$). Correlation between the C-class (CEAP classification) and the severity score (VCSS) was found excellent ($r = 0.80$). Obese patients had more axial reflux than the two other groups. There was no relationship between disease duration, bodyweight, and severity within each group. After eradication of superficial reflux, disappearance of preoperative deep reflux was lowest among obese patients (13.7%) compared to overweight patients, 22.5%.

CONCLUSIONS: There was a close relation between bodyweight and clinical severity of primary venous disease. Both overweight and obesity appears to be a separate risk factor for increased severity in patients with chronic primary venous disease without correlation to disease duration. CEAP and VCSS seem to accurately evaluate disease severity with an excellent correlation between the two scores. Concomitant primary deep venous reflux is more often observed in the obese patients, with less abolishment following eradication of the superficial reflux than observed for normal weight and overweight patients.

1:40 pm – 2:00 pm 32 **Population-Based Analysis of Venous Thrombotic Events Following Saphenous Ablation**

J. Benarroch-Gampel, K. M. Sheffield,
C. A. Boyd, T. S. Riall, L. A. Killewich

University of Texas Medical Branch, Galveston, TX

BACKGROUND: Venous thrombotic events following great and small saphenous vein ablation procedures for varicose veins have been reported. Current knowledge of these events is based on single institution studies with small sample sizes.

METHODS: The National Surgical Quality Improvement Program (NSQIP) database (2005–2009) was used to identify a total of 3,874 patients who underwent radiofrequency ablation (RFA) or endovenous laser ablation (EVLA) of the great and small saphenous veins with or without stab phlebectomy. Outcome variables included clinically documented post-operative deep vein thrombosis (DVT) or pulmonary embolism (PE). Bivariate and multivariate logistic regression analyses were performed to identify factors associated with venous thrombotic events after ablation procedures.

RESULTS: A total of 2,897 (74.8%) patients underwent RFA and 977 (25.2%) underwent EVLA for lower extremity varicose veins. Patients who underwent RFA were more likely to be older (53.8y vs 51.8y, $P < 0.0001$), obese (42.8% vs 38%, $P = 0.009$), diabetic (8.5% vs 6.4%, $P = 0.01$) hypertensive (31.9% vs 26.8%, $P = 0.002$) and to have undergone procedures involving both veins (24% vs 4%, $P < 0.0001$). Patients who underwent EVLA were more likely to have received general anesthesia (56.9% vs 40.8%, $P < 0.0001$), to have undergone concomitant stab phlebectomy (44.9% vs 31.7%, $P < 0.0001$), and had longer operative times (63.6 min vs. 57.3 min, $P < 0.0001$). The incidence of DVT (1.74% vs 1.52%, $P = 0.63$) and pulmonary embolus (0.07% vs 0%, $P = 1$) were similar between EVLA and RFA. No significant predictors of DVT in the postoperative period were identified on bivariate or multivariate analyses. In the subgroup of patients who underwent ablation procedures only (no stab phlebectomy, $N = 2,514$), there was a trend toward higher incidence of DVT in patients undergoing EVLA (2.6% vs 1.4%, $P = 0.057$). After adjusting for patient demographics, patients presenting with lower extremity ulcers were 2.4 times more likely to develop DVT compared to those without ulcers ($OR = 2.4$, $95\%CI = 1.01–6.11$, $P = 0.04$). In the multivariate model when only ablation procedures were performed, EVLA was associated with an 83% increase in odds of DVT compare to RFA, although not statistically significant ($OR = 1.83$, $95\%CI = 0.95–3.52$, $P = 0.06$).

SATURDAY

CONCLUSIONS: The incidence of venous thrombotic events after saphenous ablation is low. However, given that patients with lower extremity ulcers experienced an increased risk of DVT, care should be taken to ensure that the ablation catheter is positioned an appropriate distance from the sapheno-femoral or sapheno-popliteal junction, and post-procedural preventative measures such as early ambulation and lower extremity compression should be emphasized. The finding of a trend toward increased venous thrombotic events in patients undergoing EVLA warrants further investigation in a large patient population.

2:00 pm – 2:20 pm 33 **Increased Estrogen Receptor-Mediated Venous Relaxation in Human Varicose Veins**

J. D. Raffetto¹, O. M. Reslan², R. A. Khalil²

¹VA Boston HCS, West Roxbury, MA, ²Brigham and Women's Hospital, Boston, MA

BACKGROUND: The incidence of varicose veins is similar among older male and female subjects. Given that estrogen receptors (ERs) have a significant vasodilator effect in various arterial preparations, we hypothesized that ERs may mediate venous dilation in the setting of varicose veins. We have recently shown that estrogenic compounds induce relaxation of rat inferior vena cava in an ER subtype-specific fashion. This study was designed to test whether specific ERs mediate relaxation in human veins, and whether ER-mediated activity and vein relaxation are enhanced in varicose veins.

METHODS: Specimens of greater saphenous vein from male patients (average 69 years old) undergoing lower extremity bypass (n = 5) were used as control veins. Varix segments were obtained from male patients (average 56 years old) undergoing varicose vein stripping (n = 6). Circular vein segments were equilibrated under 2 g of tension in a tissue bath containing Krebs solution, bubbled with 95% O₂, 5% CO₂, at 37°C, and the changes in isometric contraction were recorded. Vein segments were pre-contracted with 96 mM KCl depolarizing solution or the α -adrenergic receptor agonist phenylephrine (Phe 10⁻⁵ M). To test for the specific ER, vein segments were treated with increasing concentrations (10⁻¹² to 10⁻⁵ M) of 17 β -estradiol (E2, activator of most ERs), PPT (ER α agonist), DPN (ER β agonist), and G1 (GPR30 agonist), and the % venous relaxation was recorded.

RESULTS: In control veins, ER agonists caused a small concentration-dependent relaxation of KCl contraction that reached a maximum at 10⁻⁵ M [E2 (15.93 \pm 6.44) \approx DPN (15.28 \pm 6.23) > PPT (13.93 \pm 4.20) > G1 (7.97 \pm 3.73)]. ER agonists-induced relaxation of KCl contraction was not different or only slightly greater in varicose veins [E2 (19.69 \pm 4.75) \approx PPT (19.76 \pm 3.02) > G1 (17.73 \pm 2.07) > DPN (15.24 \pm 4.36)]. Compared to the relaxation of KCl contraction, ER agonists caused greater relaxation of Phe contraction in control veins [E2 (25.00 \pm 5.66) \approx PPT (25.09 \pm 5.90) > DPN (19.56 \pm 8.90) > G1 (13.68 \pm 8.26)]. In comparison, the ER agonists caused significantly greater relaxation of Phe contraction in varicose veins [E2 (50.76 \pm 8.16) \approx DPN (51.11 \pm 8.69) > PPT (46.68 \pm 10.69) > G1 (42.30 \pm 6.98)].

SATURDAY

CONCLUSION: In control veins, ER agonists cause small relaxation of KCl-induced contraction, suggesting some inhibition of Ca^{2+} entry through voltage-gated channels; and greater relaxation of Phe contraction, suggesting inhibition of additional receptor-operated Ca^{2+} channels or Ca^{2+} -sensitization mechanisms. In varicose veins, ER agonists cause markedly greater relaxation of Phe, but not KCl, contraction, suggesting greater expression/activity of ER and enhanced post-ER inhibitory effects on receptor-operated Ca^{2+} channels or Ca^{2+} -sensitization mechanisms, leading to less contractile and more distensible veins, and thereby possibly account for the increased venous dilation associated with varicose veins.

2:20 pm – 2:40 pm 34 **Which Is More Important for Postoperative Recovery: Laser Wavelength or Fibers?**

L. S. K. Kabnick

New York University, New York, NY

BACKGROUND: Rapid progression in technique and technology has characterized the growth of endovenous laser ablation since its inception. Moreover, the treatment parameters that have demonstrated significance in altering patient outcomes including: power, wavelength, linear endovenous energy density (LEED), and type of fiber-tip. Postoperative outcomes concerning pain and bruising have been attributed to vein wall perforation. This study presents an in-vitro method to quantify the potential for pain and bruising by comparing the degree of perforation of vessels with regard to wavelength and fibers.

METHODS: A direct comparison was performed using 810 nm and 1470 nm diode lasers at clinically relevant treatment parameters in combination with Bare Tip (BT) vs. Jacketed Tip (JT) fibers. Cohorts of 12 samples each were tested encompassing 810 nm/BT Fiber, 810 nm/JT Fiber, 1470 nm/BT Fiber, and 1470 nm/JT Fiber.

Simulated veins with a thickness of 0.5 mm were staked on a gelatin base. The fibers were attached to a motorized slide and oriented so the fiber tip was in contact and parallel to the vein throughout each test run. The assembly was covered with sheep blood to a depth of 2–3 mm. The pullback slide and laser were started simultaneously, pulling fibers over the vein at set rates to achieve the desired LEEDs. The lengths of all perforations within a vein segment were measured, added together and divided by the vein length to obtain the percent length of perforation.

RESULTS: The results show the degree of perforation for each test group along with the t-test statistical analysis between groups. (See Tables) The actual treatment lengths had a mean of 61.6 mm \pm 5.4 mm. There was no significant difference between the groups of vessel lengths.

Results 1:							
GROUP	LASER	POWER	LEEDS	FIBER	N	MEAN	SD
C1	810 nm	14W	80J/cm	BT	12	19.0%	12.5%
C2	810 nm	14W	80J/cm	JT	12	2.09%	7.25%
C3	1470 nm	6W	42J/cm	BT	12	16.6%	14.6%
C4	1470 nm	6W	42J/cm	JT	12	1.94%	3.39%

SATURDAY

Results 2:			
Comparison Groups	Mean Difference	95% C.I. for Difference	P Value
G1 Vs. G2	16.9%	8.11, 25.69	0.001
G1 Vs. G3	2.40%	-9.12, 13.92	0.669
G1 Vs. G4	17.05%	8.91, 25.81	0.001
G2 Vs. G3	-14.50%	-24.45, -4.54	0.007
G2 Vs. G4	0.15%	-4.77, 5.07	0.95
G3 Vs. G4	14.65%	5.23, 24.06	0.005

CONCLUSIONS: Surprisingly, neither wavelength was superior when comparing like fibers in degree of perforations. However, jacketed tip fibers demonstrated a significantly lower degree of perforation compared to bare tip fibers with either the 810 or 1470 nm lasers at standard clinical parameters. This in vitro study suggests that jacketed tip fibers are superior in terms of postoperative recovery limiting pain and bruising.

**2:40 pm – 2:45 pm QS-11 Great Saphenous Vein Diameter
Is Associated with Venous Clinical
Scores, But Not Quality of Life**

A. C. Shepherd, T. R. A. Lane, M. S. Gohel,
A. H. Davies

Imperial College, London, United Kingdom

BACKGROUND: It has been suggested that great saphenous vein diameter has an impact on symptoms and is used as a discriminating factor for reimbursement by some insurance companies. The aim of the study was to evaluate the relationship between vein diameter and disease specific quality of life and clinical severity.

METHODS: Data regarding great saphenous vein diameters (VD) was obtained from duplex scans from patients with primary great saphenous vein reflux awaiting intervention. The Aberdeen Varicose Vein Questionnaire (AVVQ), the Venous Clinical Severity Score (VCSS) and clinical CEAP grade was recorded.

RESULTS: Data was available for 299 patients, the median (IQR) AVVQ was 19 (13.2–25.4) and VCSS 5 (4–8). Median (IQR) VD was 7.9 mm (6.0–10.0 mm). Patients with C4–C6 disease had significantly larger vein diameters than patients with C2–C3 disease ($p = 0.006$ Mann-Whitney U test) and a weak correlation was observed between VD and the VCSS ($p = 0.004$ Spearman correlation 0.165). No correlation was observed between the AVVQ and VD ($p = 0.181$ Spearman correlation 0.078). Veins were divided into groups of ≤ 4 , 5 and 6 mm respectively for further analysis.

VD (mm)	≤ 4	≥ 4.1	≤ 5	≥ 5.1	≤ 6	≥ 6.1
Number of patients	26	273	47	252	80	219
AVVQ mean (s.d)	18.9 (8.6)	21.0 (10.9)	19.5 (9.8)	21.1 (10.9)	18.7 (9.5)	21.6 (11.0)
AVVQ p value*		0.328		0.348	0.040	
VCSS mean (s.d)	5.9(3.2)	6.1(2.8)	5.5(2.7)	6.2(2.8)	5.5(2.7)	6.3(2.)
VCSS p value*	0.739	0.080	0.019			

*T test

CONCLUSIONS: Larger vein diameters were associated with worse clinical disease severity according to physician reported VCSS scores, but did not correlate with disease specific quality of life. Patients with vein diameters greater than 6 mm had significantly worse clinical and system specific quality of life scores.

SATURDAY

2:45 pm – 2:50 pm **QS-12 Implications of the Expanded Venous Reflux Study**

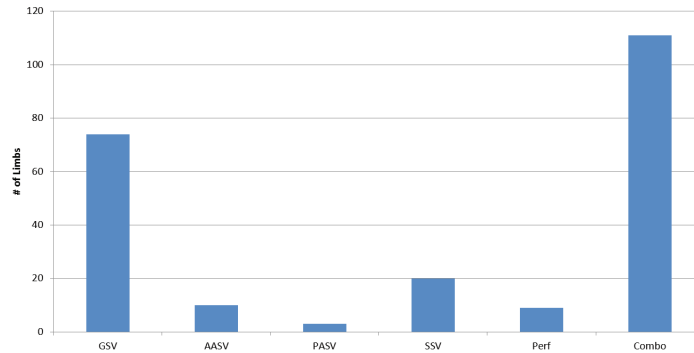
D. M. Coleman, D. Campbell, K. Shuster,
S. Brown, C. Stabler, T. W. Wakefield
University of Michigan, Ann Arbor, MI

BACKGROUND: Duplex ultrasonography remains the diagnostic modality of choice used to assess for venous reflux. Historically, our institution's practice assessed for deep venous reflux at the level of the common femoral and femoral veins, and the saphenous vein was imaged at the saphenofemoral junction (SFJ). The American Venous Forum's Venous Registry attempts to standardize the collection and analysis of clinical information on venous disease. As such, patients are subjected to a more complete study that expands on the superficial venous system. This investigation aims to identify those patients with superficial venous reflux whose diagnosis may have been missed with our previous protocol.

METHODS: This study reflects a retrospective review of all venous reflux studies performed with the expanded imaging protocol between October 1, 2010 and July 29, 2011, imaging the distal external iliac, common femoral, femoral, popliteal, posterior tibial, peroneal and anterior tibial veins. The great saphenous vein (GSV), small saphenous vein (SSV), anterior and posterior accessory saphenous veins (AASV and PASV), and perforator veins were evaluated for patency and reflux at multiple stations. The incidence and trends of various reflux patterns were examined.

RESULTS: 1091 limbs of 593 patients were examined during this ten-month time period. 75 limbs were excluded on the grounds of previous GSV harvest, stripping or ablation, limiting our analysis to 1001 limbs. 113 limbs (11%) revealed deep venous reflux without associated superficial reflux, 161 limbs (16%) revealed isolated superficial venous reflux, and 594 limbs (59%) revealed combined deep and superficial venous reflux. Of the 755 total limbs with superficial venous reflux, 528 limbs (79%) revealed reflux at the SFJ and 227 limbs (30%) revealed superficial reflux without reflux at the SFJ. Of this "accessory venous reflux cohort" 74 limbs (33%) revealed GSV reflux caudal to the junction, 10 limbs (4%) revealed isolated AASV reflux, 20 limbs (8%) revealed isolated SSV reflux, 3 limbs (1%) revealed isolated PASV reflux, 9 limbs (4%) revealed isolated perforator reflux and 111 limbs (49%) revealed a combination of accessory reflux patterns. (Figure 1).

Figure 1: Patterns of Accessory Venous Reflux



CONCLUSION: In summary, while the expanded venous reflux study requires more time and skill to perform, it reveals a cohort of patients with superficial venous insufficiency that may have previously been missed. Specifically, 227 limbs in our series (23% of the total series and 30% of limbs with superficial venous reflux) demonstrated 'accessory' superficial venous reflux patterns without reflux at the SFJ which may have previously gone un-diagnosed.

3:00 pm – 7:00 pm

Free Afternoon

7:30 pm – 10:00 pm

THE FORUM FINALE

Awards, Dinner, Entertainment & More!

SATURDAY