2014 Annual Meeting, New Orleans, LA

Antonios Gasparis, MD
2014 Annual Program Committee Chair

The 26th Annual Meeting of the American Venous Forum (AVF) was held at The Roosevelt on February 19-21, 2014, in New Orleans, Louisiana where a record attendance occurred with over 700 participants. This is the same city where the first AVF Annual Meeting took place.

The meeting kicked off on Wednesday morning, February 19, with the David S. Sumner Venous Summit. The program, titled *When Things Go Wrong – A Rare Case of Mismanagement*, was chaired by Dr. Fedor Lurie and featured presentations by 11 esteemed faculty. The presentations focused on some of the undesirable outcomes that arise from variability in patient care patterns and quality in the expanding world of venous health care. Topics included complexity of patient care and optimal settings; controversies and paradigms in managing chronic venous disease, venous reflux, EHIT, and pulmonary embolism; post-treatment management of superficial vein procedures, venous ablations and post-thrombotic syndrome; and various aspects of "when things go wrong," including ethical and legal aspects, insurance, and the role of professional societies.

Following the David S. Sumner Venous Summit, the general session began with a welcome from Drs. Peter Henke and Antonios Gasparis, AVF President and Annual Program Committee Chair, respectively. The topic of Scientific Session 1 was superficial vein disease, and included talks on development of a disease-specific patient assessment tool, phlebectomy, endovenous laser ablation, microfoam treatment of varicose veins, and venous reflux. This session also featured four quick-shot presentations. The day continued with Scientific Session 2 on chronic venous obstructions. This was a stimulating session featuring presentations on venous stents, chronic venous obstructions, iliac vein obstruction, balloon angioplasty and intimal hyperplasia. Wednesday concluded with a Welcome Reception in the exhibit hall.

Thursday began with two special breakfast sessions hosted by the AVF. The *New Member Breakfast with the Board* welcomed all new AVF members who joined the association in 2013 and early 2014, and offered them a chance to become acquainted with current AVF leadership. The *Intro to AVF Guest Breakfast* was hosted by the AVF Membership Committee and all non-member meeting attendees were invited.

The program on Thursday started with Scientific Session 3 which focused on venous thromboembolism and IVC filters, deep vein thrombosis, and catheter-directed thrombolysis. Two of the presentations in session 3 were given by the 2014 winners of the Servier Traveling Fellowship. This was followed by the ACP Symposium which focused on *The Evaluation and Treatment of Non-Truncal Varicose Veins of the Lower Extremities.* The ACP Symposium was chaired by Mark Forrestal, MD and featured five additional speakers from the American College of Phlebology- Diana Neuhardt, RVT, Carl Black, MD, Marlin Schul, MD, Nick Morrison, MD, and Lisa Pavone, MD. The afternoon continued with the Villavicencio Symposium – *Acute venous Thromboembolism: A Focus on Acute PE*, chaired by Dr. Victor Tapson. The Villavicencio Symposium focused on treatment of acute VTE, with emphasis on pulmonary embolism. Treatments discussed include anticoagulants and low molecular weight heparins, catheter-directed thrombolytic therapy, vena cava filters, acute embolectomy and other novel therapeutic maneuvers being increasingly utilized for patients with more extensive emboli. Additional speakers included Tod Englehardt, MD and Anthony Comerota, MD. Scientific Session 4 on chronic venous obstructions included discussion on venous stenting in the elderly, compression, study of venous anatomy in human embryos, recanalization and neovascularization after DVT, and muscle oxygenation during exercises after DVT. This was followed by the Best Paper Session, featuring top abstracts from the European Venous Forum, the American College of Phlebology, and the Royal Society of Medicine. The European Venous Forum had two speakers; Katy Darvall, MBChB, MRCS who spoke about long-term clinical effectiveness of ultrasound-guided foam sclerotherapy for varicose veins; and Christos Karathanos, MD who presented on factors associated with the development of superficial vein thrombosis in patients with varicose veins. Caroline Fife, MD presented the best paper from the American College of Phlebology on real time visualization of lymphatic dysfunction in venous ulcer patients and the effect of pneumatic compression. From the Royal Society of Medicine, Oliver Lyons, MD discussed genetic patterning of development, control and maintenance of venous valves.

The American Venous Forum was honored to welcome keynote speaker Alberto Smith, PhD of Kings College London to present the D. Eugene Strandness Memorial Lecture entitled *Insights into Mechanisms That Regulate the Resolution of Venous Thrombi*. Alberto Smith is a Professor of Vascular Science and Head of the Academic Department of Surgery at King's College London. His research centers around the regulation of tissue remodeling in vascular diseases, particularly venous disease. The emphasis of his research is on the elucidating mechanisms that regulate thrombus resolution and the development and maintenance of venous valves. This work is carried out using both models of disease and studies in man, and is facilitated by biochemical, histological, genetic and novel imaging techniques. He is a founding member of the European Vascular Biology Organization and is the non-clinical member of the Vascular Society of Great Britain & Ireland Research Committee. The Strandness Memorial Lecture was followed by

twenty poster presentations, delivered to the entire general session room using digital displays. The Poster Reception followed immediately after the Poster Presentations in the Poster Hall, which had sixty Poster Displays on exhibit Wednesday through Friday.

Friday morning began bright and early with a symposium by the International Union of Phlebology, chaired by Nick Morrison, MD and Angelo Scuderi, MD. The UIP Symposium, titled *Guidelines and Consensus of UIP*, featured talks by Armando Schapira, MD, Eduardo Tkach, MD, Attilio Cavezzi, MD, Pier Luigi Antignani, MD, Malay Patel, MD, Philip Coleridge-Smith, DM FRCS, and Kurosh Parsi, MD. Discussions included a summary of UIP's last consensus, guidelines on diagnosis of lymphedema, venous hemodynamics, a UIP consensus on foam sclerotherapy, and guidelines on diagnosis of vascular malformations. The UIP Symposium was followed by Scientific Session 5 on superficial vein disease. Topics included vein closure rates for ultrasound guided foam sclerotherapy and endovenous microfoam treatment, use of a novel biodegradable implant to treat reflux, a clinical trial comparing endovenous laser ablation and surgery for treating small saphenous insufficiency, a study of the availability of varicose vein treatments on the internet, and metabolic profiling of chronic venous ulceration.

The President's Session opened with reports from our two Servier Traveling Fellowship winners from 2013, Andrea Obi, MD and Carson Oostra, MD, who presented their research at the European Venous Forum Annual Meeting in Belgrade, Serbia. The Servier Traveling Fellowship provides travel expenses to the award winner and is sponsored by Servier Laboratories. The next presentation was the 2013 BSN Jobst Research Grant recipient, Xabia Caliste, MD. Dr. Caliste presented on her research project on venous thromboembolism following trauma or surgery. Jose Almeida, MD gave an update on the progress of the Vascular Quality Initiative, a collaborative project of SVS and AVF. President of the AVF Foundation, Peter J. Pappas, MD, gave an update on the 2013 developments of the Foundation. The Foundation update was followed by two memorial tributes to AVF Founding Members who have recently passed away. A tribute for Dr. James DeWeese was presented by John Blebea, MD who studied under Dr. DeWeese and a tribute for Dr. David S. Sumner was presented by Robert McLafferty, MD. The chairman of the AVF Membership Committee, Jose Almeida, MD, spoke about the Committee's three year plan to grow AVF membership.

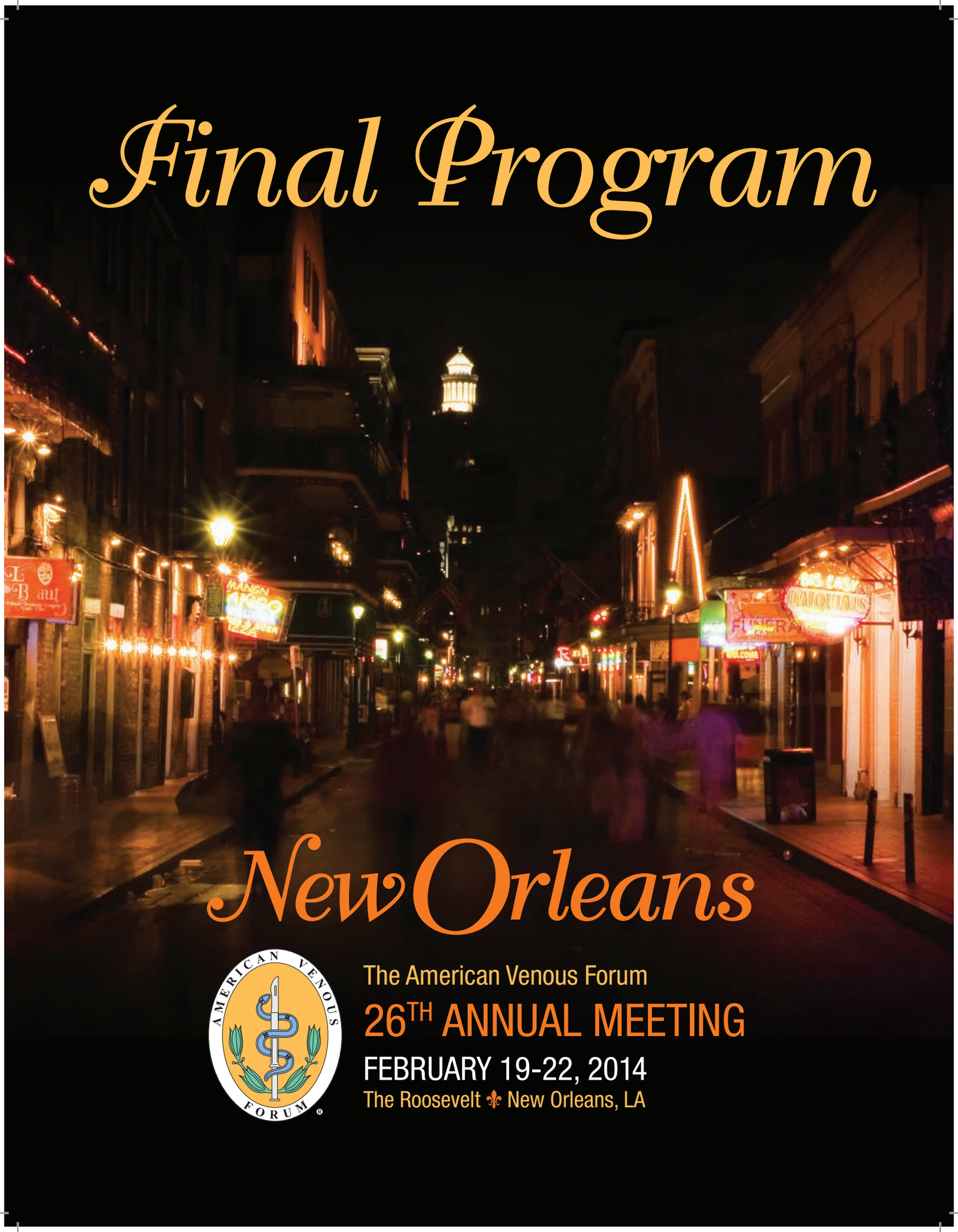
The 2013 AVF President-Elect, Fedor Lurie, MD, gave the Presidential Address Introduction, citing facts and anecdotes about Peter Henke, MD. The Presidential address was delivered by 2013-2014 AVF President, Peter K. Henke, MD. He expressed gratitude and appreciation of the many people who have offered him support throughout his life, career and presidency with AVF. He spoke of the accomplishments of AVF during his year as President and the direction the association is going as he succeeds to Past President. The President's Session was followed by the Annual AVF Member Business Luncheon.

Friday afternoon continued with Scientific Session 6, a mix of venous topics including metabolic phenotype of varicose veins, morphological changes in a vein after radiofrequency ablation, baboon model study of venous thrombosis, a study of pro-thrombotic biomarkers to detect risk of

thrombosis, venous therapy for autonomic dysfunction, and a bioprosthetic bicuspid venous valve. Session 6 was followed by the Specialty Symposia Sessions. The 26th Annual Meeting expanded the Specialty Symposia again, this year featuring six different Symposia split into two sessions. Specialty Symposium A: Deep Venous Disease, chaired by Suresh Vedantham, MD included speakers Akhilesh Sista, MD, Suman Rathbun, MD, and Elna Masuda, MD. Specialty Symposium B/F: Vascular Medicine & Thrombosis was chaired by Thom Rooke, MD and included speakers Steven Dean, MD and Theresa Carman, MD. Specialty Symposium C/G: Wound Care, Lymphedema & Compression was chaired by Colleen Moore, MD and included speakers Kathleen Ozsvath, MD, Audra Duncan, MD, and Manju Kalra, MD. Specialty Symposium D: Animal Models in Venous Research was chaired by Jose Antonio Diaz, MD and included speakers Thomas Wakefield, MD, Prakash Saha, MD, Daniel Myers, PhD, and Joseph Raffetto, MD. Specialty Session E: Superficial Veins Done Differently was chaired by Steven Elias, MD and included speakers Ellen Dillavou, MD, Peter J. Pappas, MD, and Jennifer Heller, MD. Specialty Symposium H: Biomechanics of Venous Valves: In Silico, In Vitro and In Vivo was chaired by Ghassan Kassab, MD and Fedor Lurie, MD and included speakers Seshadri Raju, MD, Fedor Lurie, MD, Michael Sacks, MD, Antonio Rosales, MD and Zachary Berwick, MD.

The 26th Annual Meeting concluded Friday evening with the Mardi Gras Soirée. The event opened with an awards ceremony given by Dr. Peter Henke, who presented the following awards: the prestigious Founder's Award was given to Lazar J. Greenfield, MD; The Best Paper Award went to Muzaffar Anwar, MBBS, MRCS; the Best Poster was awarded to Katherine Gallagher, MD; the two winners of the Servier Traveling Fellowship were Adam Ring, MD and Rafael Malgor, MD; and the recipient of the 2014 BSN Jobst Research Grant of $50,000 was Harry Ma, MD from University of Oklahoma. After awards were announced, the festively costumed attendees enjoyed New Orleans cuisine and music from a live New Orleans jazz band.

Final Program



New Orleans

The American Venous Forum

26TH ANNUAL MEETING

FEBRUARY 19-22, 2014

The Roosevelt ⚜ New Orleans, LA

ABOUT AVF

The American Venous Forum (AVF) is dedicated to improving the care of patients with venous and lymphatic disease. Founded in 1987, AVF fosters cutting edge research and clinical innovation and educates health care professionals, patients and policy makers about venous and lymphatic diseases. AVF's leadership and membership are recognized internationally as thought leaders, expert investigators and clinicians in venous and lymphatic disease.

LEARNING OBJECTIVES

The objective of this comprehensive meeting is to provide those attending knowledge of current thinking in effective clinical management of venous disease and insight into future directions from critical analysis of investigative findings.

ACCREDITATION STATEMENT

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint sponsorship of the American College of Surgeons and the American Venous Forum. The American College Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

American College of Surgeons
Division of Education

AMA PRA CATEGORY 1 CREDITS™

The American College of Surgeons designates this live activity for a maximum of 20.5 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

EVALUATIONS

Please take time to complete the Annual Meeting evaluation form provided in your registration bag. Your input and comments are essential in planning future educational events. Completed evaluations may be returned to the AVF Registration Desk. ***Evaluations must be returned if you plan to claim CME credit hours for this program.***

DISCLOSURE INFORMATION

In compliance with ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed all relevant financial relationships with any commercial interest. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Please see the insert to this program for the complete disclosure list.

GRANT ACKNOWLEDGEMENT

The American Venous Forum wishes to recognize and thank the following companies for their ongoing support through annual meeting educational grants: AngioDynamics, Boston Scientific, Cook Medical, Covidien and Volcano Corporation.

MARKETING & EXHIBITOR ACKNOWLEDGEMENT

The American Venous Forum wishes to recognize and thank the following exhibiting companies for their ongoing support: ACI Medical, LLC; American Board of Venous & Lymphatic Medicine; American College of Phlebology, AngioDynamics; Bayer Healthcare; biolitec U.S., Inc.; Boston Scientific; BSN medical, Inc.; BTG; Cook Medical; Cool Touch Inc.; Covidien; DJO Global; Dornier MedTech America, Inc.; EKOS Corporation; HK Surgical; Hokanson; Intersocietal Accreditation Commission; Juzo USA; LeMaitre Vascular; LP Surgical Fibers; Medi USA; Medical Positioning Inc.; Medstreaming; Organogenesis, Inc.; Precision Medical Billing, LLC; Primus Pharmaceuticals, Inc.; SIGVARIS; Society for Vascular Surgery Patient Safety Organization; Stradis Healthcare; Streamline MD; Tactile Medical; Therafirm, a brand of Knit-Rite, Inc.; Total Vein Systems; TransLite, LLC; Vascular Insights; Vein Clinics of America; VEIN Magazine; Vein Therapy News; Vein Spec EMR; VENOSAN Compression Stockings;Volcano Corporation; and, WRIGHT Therapy Products, Inc.

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MEETING PROGRAM

Message From The President

Dear AVF Members and Meeting Attendees,

Welcome to the American Venous Forum 26th Annual Meeting in New Orleans, Louisiana!

We are honored to be holding this meeting in New Orleans, where the very first AVF Annual Meeting was held in 1989. We are truly pleased to have some of the original Founding Members here with us, along with many colleagues attending for the first time!

The Annual Meetings of the AVF have traditionally high standards for cutting edge, high-quality scientific presentations of the latest, most relevant research and information in the field of venous and lymphatic healthcare. The mission and initiatives of the American Venous Forum focus on research and education. This meeting will fulfill that mission with an esteemed faculty and stimulating scientific program.

Some of the special features of the 26th Annual Meeting include:

- The David S. Sumner Venous Summit, presented by AVF President-Elect Fedor Lurie, MD, is about ethical, legal and reimbursement issues involved cases of venous disease mismanagement.
- Specialty Symposia on Deep Venous Disease; Vascular Medicine & Thrombosis; Wound Care, Lymphedema & Compression; Animal Models in Venous Research; Superficial Veins Done Differently; and, Biomechanics of Venous Valves: In Silico, In Vitro and In Vivo.
- The Villavicencio Symposium addresses acute pulmonary embolism and will be led by Victor Tapson, MD. This annual symposium honors Dr. J. Leonel Villavicencio, an AVF founding member who is noted for his career in treating venous malformation.
- D. Eugene Strandness Memorial Lecture, presented by Alberto Smith, PhD, Professor of Vascular Science and Head of the Academic Department of Surgery at King's College London.
- Scientific sessions featuring never-before-presented abstracts from leading scientists on topics including superficial venous disease, venous thromboembolism/IVC filters, and chronic venous obstructions.
- Oral, quick-shot, poster presentations and displays of scientific abstracts.
- Mardi Gras Soirée featuring the AVF Awards Ceremony, New Orleans cuisine and a live New Orleans Jazz band.

The year 2013 has been a year of growth and development. Through collaboration and teamwork AVF has made some great accomplishments in 2013 and added new initiatives and benefits for our members. I am thrilled to welcome all of the new members who joined AVF in 2013 and hope to meet you at the New Member Breakfast with the Board. Attendees who have not yet joined the AVF Membership are invited to learn about this esteemed association at the Introduction to AVF Guest Breakfast with the AVF Membership Committee.

I would like to thank the AVF Board of Directors, AVF Committees, the Foundation Board of Directors, and the AVF staff for all of their hard work and dedication this year. It has been a pleasure working with our President-Elect, Fedor Lurie, and we look forward to his guidance in 2014 as our next AVF President.

It has truly been an honor to work with you this past year.

Sincerely,

Peter Henke, MD
AVF President

TUESDAY, FEBRUARY 18		
4:00 PM – 8:00 PM	Registration Open	Roosevelt Foyer
WEDNESDAY, FEBRUARY 19		
7:00 AM – 6:30 PM	Registration Open	Roosevelt Foyer
7:00 AM – 8:00 AM	Continental Breakfast	Roosevelt Promenade
7:00 AM – 8:00 AM	Industry Appreciation Breakfast	Chambers 1 & 3
7:00 AM – 8:00 AM	Vascular Insights Industry Symposium*	Chambers 2 & 4
8:00 AM – 12:00 PM	David S. Sumner Venous Summit	Roosevelt Ballroom
12:00 PM – 7:30 PM	Exhibit Hall Open	Crescent City Ballroom
12:00 PM – 1:00 PM	Break	
12:00 PM – 1:00 PM	Cook Medical Industry Symposium*	Chambers 1 & 3
1:00 PM – 6:00 PM	Poster Hall Open	Waldorf Astoria Ballroom
1:00 PM – 1:05 PM	President & Annual Meeting Chair Welcome	Roosevelt Ballroom
1:05 PM – 3:03 PM	Scientific Session 1: Superficial Vein Disease 1	Roosevelt Ballroom
3:03 PM – 3:30 PM	Coffee Break	Crescent City Ballroom
3:30 PM – 5:30 PM	Scientific Session 2: Chronic Venous Obstructions 1	Roosevelt Ballroom
6:00 PM – 7:30 PM	Welcome Reception	Crescent City Ballroom
7:30 PM – 9:30 PM	Tactile Medical Industry Symposium*	Blue Room
THURSDAY, FEBRUARY 20		
6:30 AM – 7:00 PM	Registration Open	Roosevelt Foyer
7:00 AM – 4:00 PM	Exhibit Hall Open	Crescent City Ballroom
7:00 AM – 8:00 AM	Continental Breakfast	Crescent City Ballroom
7:00 AM – 8:00 AM	New Member Breakfast with the Board	Orpheum Room
7:00 AM – 8:00 AM	Intro to AVF Guest Breakfast	Blue Room
8:00 AM – 6:30 PM	Poster Hall Open	Waldorf Astoria Ballroom
8:00 AM – 10:00 AM	Scientific Session 3: Venous Thromboembolism/IVC Filters	Roosevelt Ballroom
10:00 AM – 10:30 AM	Coffee Break	Crescent City Ballroom
10:30 AM – 12:00 PM	ACP Symposium – The Evaluation of Non-Truncal Varicose Veins of the Lower Extremities	Roosevelt Ballroom
12:00 PM – 12:15 PM	Boxed Lunch	Roosevelt Promenade
12:15PM – 1:15 PM	Villavicencio Symposium – Acute Venous Thromboembolism: A Focus on Acute PE	Roosevelt Ballroom
1:15 PM – 3:15 PM	Scientific Session 4: Chronic Venous Obstructions 2	Roosevelt Ballroom
3:15 PM – 3:40 PM	Coffee Break	Crescent City Ballroom
3:40 PM – 4:20 PM	Best Paper Session	Roosevelt Ballroom
4:20 PM – 5:10 PM	D. Eugene Strandness Memorial Lecture – Insights into Mechanisms that Regulate the Resolution of Venous Thrombi	Roosevelt Ballroom
5:15 PM – 7:00 PM	Poster Presentations	Roosevelt Ballroom
6:30 PM – 7:30 PM	Exhibit Hall Open	Crescent City Ballroom
7:00 PM – 7:30 PM	Poster Reception	Waldorf Astoria Ballroom
7:30 PM – 9:00 PM	BTG International, Inc. Industry Symposium*	Blue Room
*Industry Symposia are not part of the official program of the AVF 26th Annual Meeting.		

FRIDAY, FEBRUARY 21		
6:30 AM – 5:30 PM	Registration Open	Roosevelt Foyer
7:00 AM – 4:30 PM	Exhibit Hall Open	Crescent City Ballroom
7:00 AM – 8:00 AM	Continental Breakfast	Crescent City Ballroom
7:00 AM – 8:00 AM	UIP Symposium: Guidelines and Consensus of UIP	Roosevelt Ballroom
8:00 AM – 9:30 AM	Scientific Session 5: Superficial Vein Disease 2	Roosevelt Ballroom
9:30 AM – 10:00 AM	Coffee Break	Crescent City Ballroom
10:00 AM – 12:00 PM	President's Session	Roosevelt Ballroom
12:10 PM – 1:10 PM	Member Business Luncheon	Blue Room
1:20 PM – 2:50 PM	Scientific Session 6: Venous Mix	Roosevelt Ballroom
2:50 PM – 3:15 PM	Coffee Break	Crescent City Ballroom
3:15 PM – 4:30 PM	Specialty Symposia	
	(A) Deep Venous Disease	Roosevelt Ballroom
	(B) Vascular Medicine & Thrombosis	Chambers 1 & 3
	(C) Wound Care, Lymphedema & Compression	Orpheum Room
	(D) Animal Models in Venous Research	Chambers 2 & 4
4:30 PM – 4:45 PM	Break	
4:45 PM – 6:00 PM	Specialty Symposia	
	(E) Superficial Veins Done Differently	Roosevelt Ballroom
	(F) Vascular Medicine & Thrombosis	Chambers 1 & 3
	(G) Wound Care, Lymphedema & Compression	Orpheum Room
	(H) Biomechanics of Venous Valves: In Silico, In Vitro and In Vivo	Chambers 2 & 4
7:00 PM – 10:00 PM	Mardi Gras Soiree	Waldorf Astoria Ballroom
*Industry Symposia are not part of the official program of the AVF 26th Annual Meeting.		

General Meeting Information

MEETING OVERVIEW

The 26th Annual Meeting of the American Venous Forum spotlights recent advances and research in venous disease through expert presentations that are relevant and innovative. The scientific program will provide panel presentations and discussions on all aspects of venous disease, diagnosis, pathophysiology and treatment.

TARGET AUDIENCE

The target audience for this program is vascular and general surgeons, interventional radiologists, interventional cardiologists, phlebologists, plastic surgeons, physician assistants, vascular nurse practitioners, technicians, technologists and other medical professionals who are currently treating venous disease.

ABSTRACTS

Oral presentations will be given by the authors of the highest scoring abstracts. Abstracts presented at the AVF 26th Annual Meeting are published in the January 2014 issue of the *Journal of Vascular Surgery: Venous and Lymphatic Disorders*, the official journal of the AVF. Presenting authors of oral presentations will submit the full manuscript for journal publication. AVF is pleased to provide a yearly subscription to the Journal to active members.

POSTER ABSTRACTS

The top 20 posters will be presented in the Roosevelt Ballroom on Thursday evening from 5:15 PM – 7:00 PM followed by a Poster Reception in the Waldorf Astoria Ballroom. Abstracts selected as poster displays will be viewable in the Waldorf Astoria Ballroom Wednesday afternoon through Friday morning.

POSTER HOURS

Wednesday, February 19	Poster Set-up	8:00 AM – 1:00 PM	Waldorf Astoria Ballroom
	Hall Hours	1:00 PM – 6:00 PM	Waldorf Astoria Ballroom
Thursday, February 20	Hall Hours	8:00 AM – 7:30 PM	Waldorf Astoria Ballroom
	Poster Presentations	**5:15 PM – 7:00 PM**	**Roosevelt Ballroom**
	Poster Reception	7:00 PM – 7:30 PM	Waldorf Astoria Ballroom
Friday, February 21	Hall Hours	8:00 AM – 10:00 AM	Waldorf Astoria Ballroom
	Poster Tear-down	10:00 AM – 12:00 PM	Waldorf Astoria Ballroom

2014 FRIEND OF AVFF RIBBONS

AVF is committed to furthering the field of venous and lymphatic health through the establishment of the American Venous Forum Foundation (Foundation) to support research, training and education. AVF members and attendees can show their support for this Foundation and their commitment to their field by purchasing a “Friend of AVFF” ribbon at the AVF registration desk. The “Friend of AVFF” ribbons are designed to be worn on the name badges of delegates attending the Annual Meeting. Ribbons may be acquired for a minimum donation of $50*.

** The AVFF is a 501(c)(3) organization; donations made to AVFF are tax-deductable as charitable contributions to the extent allowed by law.*

REGISTRATION

Registration packets are ready for pick up at the AVF Registration Desk located in the Roosevelt Foyer for those pre-registered for the Annual Meeting. Onsite registration for the AVF Annual Meeting is accepted, space permitting.

David S. Sumner Venous Summit: Registration is by separate subscription and includes the David S. Sumner Venous Summit on Wednesday, February 19. The David S. Sumner Venous Summit is eligible for 4 *AMA PRA Category 1 Credits*™ and 4 Self-Assessment Credits. A pre and post test must be completed by the designated deadlines in order to receive the Self-Assessment Credits.

Annual Meeting Registration: Registration includes all scientific sessions, Specialty Symposia, continental breakfast, coffee breaks, boxed lunch, Exhibit Hall, Welcome Reception, and Poster Reception.

Specialty Sessions Only: Specialty Sessions Only registration includes two Specialty Symposia sessions on the afternoon of Friday, February 21. Registration is accepted onsite, space permitting. Note: Specialty Symposia are included in Annual Meeting Registration.

Spouse/Guest Registration: The Spouse/Guest registration fee includes morning refreshments daily in the Hospitality Suite, the Welcome Reception, and access to the Exhibit Hall. This does not include access to the scientific sessions or the Mardi Gras Soirée.

Mardi Gras Soirée: Join us for the Mardi Gras Soirée on Friday evening for the AVF Awards Ceremony, cocktail reception, New Orleans cuisine and a live New Orleans jazz band. Tickets are available for attendees and their guests for $75.00 each. Tickets for corporate guests and industry representatives are $175. Tickets to the Mardi Gras Soirée are available for purchase during advance registration and onsite but cannot be guaranteed same-day.

REGISTRATION DESK

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

Tuesday, February 18	4:00 PM - 8:00 PM
Wednesday, February 19	7:00 AM - 6:30 PM
Thursday, February 20	6:30 AM - 7:00 PM
Friday, February 21	6:30 AM - 5:30 PM

THE ROOSEVELT NEW ORLEANS

The Roosevelt stands in the same place it has for more than 100 years, at the heart of all the history, cuisine, entertainment and culture that made New Orleans famous. Just past the hotel's magnificent brass doors are the narrow streets and old-world charm of the French Quarter. Stroll along the shop-lined sidewalks of Royal Street. Immerse yourself in the constant buzz of activity at Jackson Square. Let your ears take you from one club to the next as you soak in a wealth of musical stylings at Preservation Hall or on Frenchmen Street. With the St. Charles and Canal streetcar lines within blocks of The Roosevelt, the rest of New Orleans is just a few stops away. Walk amongst the centuries-old live oaks of City Park or marvel at the majestic homes of the historic Garden District. When you stay at The Roosevelt, all of New Orleans is yours to explore.

AREA ATTRACTIONS

- Jackson Square
- French Quarter
- Shopping on Royal Street
- The National WWII Museum
- Audubon Insectarium
- Audubon Aquarium of the Americas
- New Orleans Museum of Art
- The Ogden Museum of Southern Art
- The Historic New Orleans Collection
- City Park
- Audubon Park

TRANSPORTATION OPTIONS

The Roosevelt's concierge (1-800-648-1200) is available to arrange transportation service.

HOTEL DINING

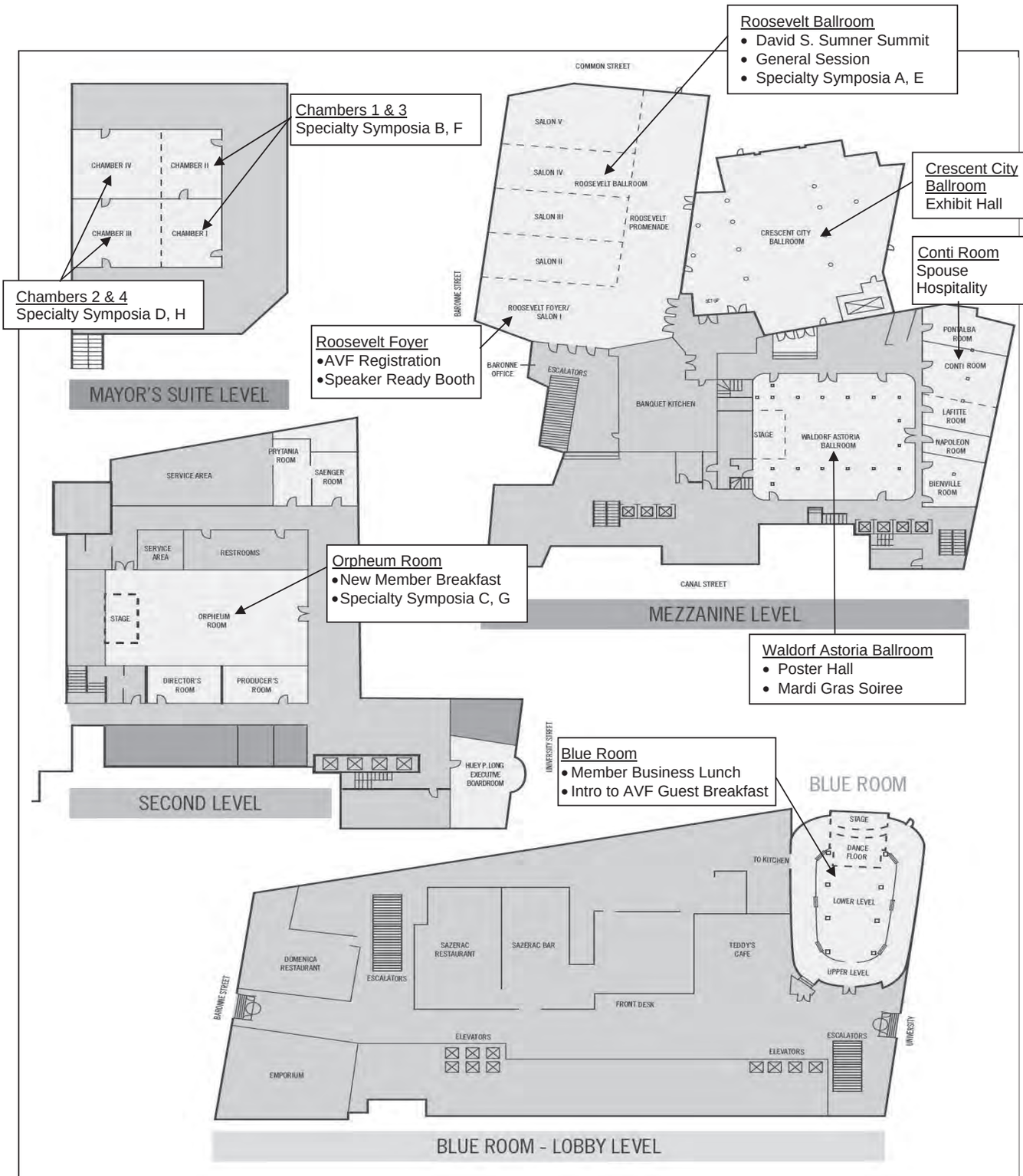
Fountain Lounge – The new Fountain Lounge brings a touch of new-world sophistication, while offering subtle nods to the timeless elements of the hotel.

The Sazerac Bar – More than just a bar, this landmark has kept the drinks and conversation flowing for decades.

Domenica – A casual, elegant take on Italian cuisine from award-winning chefs John Besh and Alon Shaya. Reservations are recommended.

Teddy's Café - Just off the Grand Lobby you will find Teddy's Café, an exclusive coffee lounge and sweets shop committed to the time-honored coffee-making tradition of New Orleans.

Hotel Map


Roosevelt Ballroom
• David S. Sumner Summit
• General Session
• Specialty Symposia A, E
Chambers 1 & 3
Specialty Symposia B, F
Chambers 2 & 4
Specialty Symposia D, H
Crescent City Ballroom
Exhibit Hall
Conti Room
Spouse Hospitality
Roosevelt Foyer
•AVF Registration
•Speaker Ready Booth
Orpheum Room
•New Member Breakfast
•Specialty Symposia C, G
Waldorf Astoria Ballroom
• Poster Hall
• Mardi Gras Soiree
Blue Room
• Member Business Lunch
• Intro to AVF Guest Breakfast
COMMON STREET
SALON V
SALON IV
ROOSEVELT BALLROOM
SALON III
ROOSEVELT PROMENADE
SALON II
ROOSEVELT FOYER/ SALON I
CRESCENT CITY BALLROOM
SETUP
BARONNE STREET
BARONNE OFFICE
ESCALATORS
BANQUET KITCHEN
STAGE
WALDORF ASTORIA BALLROOM
PONTALBA ROOM
CONTI ROOM
LAFITTE ROOM
NAPOLEON ROOM
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CHAMBER II
CHAMBER III
CHAMBER I
MAYOR'S SUITE LEVEL
SERVICE AREA
PRYTANIA ROOM
SAENGER ROOM
SERVICE AREA
RESTROOMS
STAGE
ORPHEUM ROOM
DIRECTOR'S ROOM
PRODUCER'S ROOM
HUEY P. LONG EXECUTIVE BOARDROOM
UNIVERSITY STREET
SECOND LEVEL
BLUE ROOM
STAGE
DANCE FLOOR
TO KITCHEN
LOWER LEVEL
UPPER LEVEL
DOMENICA RESTAURANT
ESCALATORS
SAZERAC RESTAURANT
SAZERAC BAR
TEDDY'S CAFE
FRONT DESK
BARONNE STREET
ELEVATORS
EMPORIUM
ESCALATORS
ELEVATORS
UNIVERSITY
BLUE ROOM - LOBBY LEVEL

About American Venous Forum

The American Venous Forum (AVF) is dedicated to improving the care of patients with venous and lymphatic disease. Founded in 1987, AVF fosters cutting edge research and clinical innovation and educates health care professionals, patients and policy makers about venous and lymphatic diseases. AVF's leadership and membership are recognized internationally as thought leaders, expert investigators and clinicians in venous and lymphatic disease.

As the field of venous and lymphatic disease grows, the AVF continues to lead by:

- Providing interactive and hands-on education to physicians and fellows
- Building multi-specialty coalitions to advocate for improvements in venous and lymphatic disease
- Increasing its patient outreach through expansion of its screening program

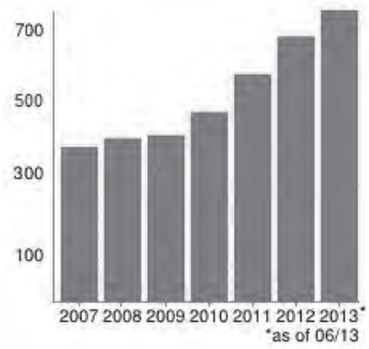
MEMBERSHIP

The AVF continues to grow and now includes more than 750 influential leaders, expert investigators and clinicians in the field of venous and lymphatic healthcare. Membership in the AVF is a mark of professional distinction and denotes a dedication to understanding and treating the entire spectrum of venous and lymphatic disorders. All non-members are invited to complete a membership application available online at www.veinforum.org.

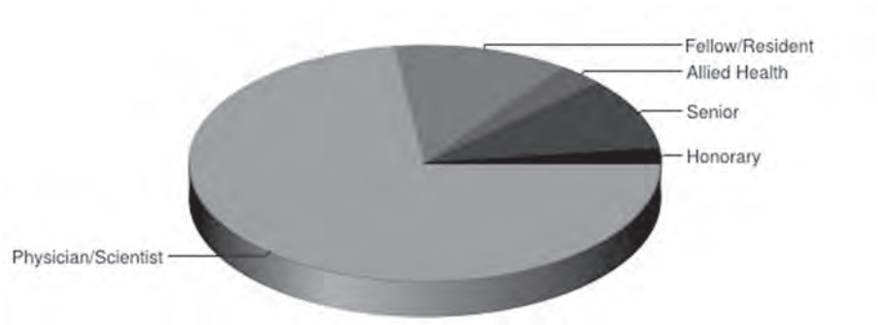
New this year are two breakfast events on Thursday morning to give new AVF members and non-members a chance to learn more about the association and engage with some of the AVF Board of Directors and leadership.

Intro to AVF Guest Breakfast is for all non-member meeting attendees.
New Member Breakfast with the Board is for all new members who have joined AVF in 2013.

AVF Membership Growth



AVF Membership Distribution



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Rafael D. Malgor, MD
The Role of Duplex Ultrasound In The Pelvic Congestion Syndrome Workup

2013 BEST POSTER WINNERS

William Marston, MD
Incidence of Ulcer Healing And Ulcer Recurrence After Endovenous Laser Ablation In CEAP Clinical Class 5 And 6 Limbs

Matthew Gibson, MD
Positive Predictive Value of Icd-9 Cm Codes for Identifying Venous Ulcer Patients: An Analysis From The Olmsted County Venous Ulcer Study

Henry Chen, MD
Fluid-structure Interaction and Design Optimization of Venous Valves

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. Chosen by the president of the American Venous Forum and confirmed by the Forum's Executive Committee, the 2014 recipient of this distinctive honor is Alberto Smith, Professor of Vascular Science and Head of the Academic Department of Surgery at King's College London.

INSIGHTS INTO MECHANISMS THAT REGULATE THE RESOLUTION OF VENOUS THROMBI

Alberto Smith, PhD
Professor of Vascular Science, Head of the Academic Department of Vascular Surgery
Kings College London at St Thomas' Hospital
London, United Kingdom

Professor Smith leads an internationally competitive research team with research interests in the field of tissue remodeling in vascular diseases. His team uses a range of research approaches including models of disease, biochemical, histological, genetic and novel imaging techniques. His research in this area (in particular venous disease) has been funded by over 40 peer-reviewed research grants from funders such as the Research Councils of the UK (MRC and BBSRC), the Wellcome Trust, the British Heart Foundation, the National Institute fro Health Research, The Royal College of Surgeons of England as well as industrial sources. This work has generated over 120 papers and several book chapters (see examples below) and his students have been the recipients of over 20 International and National awards.

Professor Smith's contributions to the area of venous disease have been in unraveling the mechanisms that regulate: thrombus resolution; venous ulcer healing; and the development and maintenance of vein valves. His recent manuscript published in Circulation 2013, on 'the mechanisms that give rise to the T1 magnetic resonance signal in a thrombus and the utility of T1 mapping in predicting the susceptibility to lysis', takes the experimental data derived from his model of venous thrombosis a step closer to the clinic.

His current activity in the venous field includes work that attempts to define:

- The utility of T1 mapping, in conjunction with other novel MRI modalities, to predict the susceptibility of a thrombus to lysis in man.
- The role of the macrophage in thrombus removal.
- Investigation of the physicogenetic regulatory mechanisms that control vein valve development and maintenance.

This lecture will be presented on Thursday, February 20, 2014 at 4:20 pm.
Please plan to attend this featured presentation.

About American Venous Forum Foundation

The American Venous Forum Foundation was organized in 1987 to support the charitable, educational and scientific purposes of the American Venous Forum. The Foundation provides the BSN-Jobst Research Grant, Servier Traveling 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.

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AWARDS & RECOGNITION

BSN-JOBST RESEARCH GRANT IN VENOUS AND LYMPHATIC DISEASE

In 1995, the American Venous Forum Foundation announced the establishment of the BSN-Jobst Research Grant in Venous and Lymphatic Disease.

The BSN-Jobst Research Grant provides a one-year, $50,000 grant to residents, fellows, and young faculty of less than 5 years from the end of their vascular training chosen through a competitive selection process. The AVF Research Committee scores the applications to determine the grant recipient and announces its selection during the Annual Meeting.

BSN-Jobst Research Grant Recipients in past years:

2013 Xzabia Calista, MD, University of Rochester
2012 Rabih Chaer, MD, University of Pittsburgh
2011 Marlene Matthews, MD, University of Rochester
2010 Yanjie Qi, MD, University of Rochester
2009 Carolyn Glass, MD, University of Rochester
2008 K. Barry Deatrick, MD, University of Michigan
2007 Danny Vo, MD, Mayo Clinic
2006 Stephanie K. Beidler, MD, University of North Carolina
2005 Allesandra Puggioni, MD, Mayo Clinic
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2003 Charles Fields, MD, Mayo Clinic
2002 Susan O'Shea, MD, Duke University Medical Center
2001 Brajesh K. Lal, MD, UMDNJ New Jersey Medical School
1999 Joseph D. Raffetto, MD, Boston Medical Center
1998 Klaus See-Tho, MD, Stanford University Medical Center
1997 Andrew C. Stanley, MD, Burlington, VT
1996 Jae-Sung Cho, MD, Mayo Clinic, Rochester, MN
1995 Peter J. Pappas, MD, UMDNJ New Jersey Medical School

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 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 2014 European Venous Forum Annual Meeting in Paris, France.

The following outstanding Servier Traveling Fellowship Recipients in past years:

2013 Carson Oostra, MD, University of Toledo College of Medicine
Andrea Obi, MD, University of Michigan

2012 Frank Vandy, MD, University of Michigan
Emily Wood, MD, Stony Brook University

2011 Faisal Aziz, MD, Jobst Vascular Center
Robert Meisner, MD, Stony Brook University Hospital

2010 K. Barry Deatrick, MD, University of Michigan
Christopher Pannucci, MD, University of Michigan

2009 Atul Rao, MD, University of Pittsburgh Medical Center
Axel Thors, MD, Good Samaritan Hospital

2008 David Paolini, MD, Toledo Hospital
Jorge Martinez, MD, Toledo Hospital

2007 Brian Knipp, MD, University of Michigan
Reagan Quan, MD, Walter Reed Army Medical Center

2006 Charles Stonerock, MD, Indiana University School of Medicine
Gustavo Oderich, MD, Mayo Clinic

7:00 AM – 8:00 AM
Continental Breakfast ..... Roosevelt Promenade

7:00 AM – 8:00 AM
Industry Appreciation Breakfast ..... Chambers 1 & 3

7:00 AM – 8:00 AM
Vascular Insights Industry Symposium ..... Chambers 2 & 4
(This Symposium is not part of the official program of the AVF 26th Annual Meeting)

8:00 AM – 12:00 PM
DAVID S. SUMNER VENOUS SUMMIT
When Things Go Wrong - A Rare Case of Mismanagement ..... Roosevelt Ballroom
Chair: Fedor Lurie, MD

An expected side effect of increasing number of practitioners who treat patients with venous disease is a substantial variation in care patterns and quality. The outcomes are not always desirable for patients, and for our specialty in general. Time has come for professional societies to take a hard look at this situation and decide what can be done to improve it. This post-graduate course will use a real case of mismanagement to learn about current standard of care for venous disease, existing evidence supporting management strategies when complications occur, and about ethical, legal and reimbursement issues involved in management of such cases. The discussion is expected to center on key questions that need to be answered by research, necessary changes in educational programs, and on the effective ways to deal with reimbursement challenges. (This course is by separate subscription.)

Complexity of Care for Patients With Venous and Lymphatic Diseases – What Are the Optimal Settings?
Lowell Kabnick, MD

Current Paradigm of Managing Primary Chronic Venous Disease
Jose Almeida, MD

Controversies in Management of SSV Reflux
Alun Davies, MD

Management of Limb Swelling After Superficial Veins Treatment
Thom Rooke, MD

Cost-Effective Management of Patients Post Venous Ablations
Mark Meissner, MD

Current Paradigm of Managing EHIT
Peter Lawrence, MD

Current Paradigm of Managing PE
Anthony Comerota, MD

Current Paradigm of Managing Post-Thrombotic Syndrome
Thomas Wakefield, MD

When Things Go Wrong – Ethical and Legal Aspects
James Brazeau, Esq.

When Things Go Wrong – Insurance Point of View
George McPheeters, MD

When Things Go Wrong – The Role of Professional Societies
Nick Morrison, MD

12:00 PM – 1:00 PM
Break for Lunch

12:00 PM – 1:00 PM
Cook Medical Industry Symposium ..... Chambers 1 & 3
(This Symposium is not part of the official program of the AVF 26th Annual Meeting)

1:00 PM – 1:05 PM
President & Annual Meeting Chair Welcome ..... Roosevelt Ballroom

1:05 PM – 3:03 PM
SCIENTIFIC SESSION 1
Superficial Vein Disease 1 ..... Roosevelt Ballroom
Moderators: Lowell Kabnick, MD, Alun Davies, MD

1:05 PM – 1:20 PM
1-1 Clinical Presentation Of Women With Pelvic Source Varicose Veins In The Perineum: First Steps In The Development Of A Disease-specific Patient Assessment Tool
K. Gibson[1], M. Meissner[2]; [1]Lake Washington Vascular Surgeons, Bellevue, WA, [2]University of Washington Department of Surgery, Seattle, WA

BACKGROUND: Pelvic venous incompetence (PVI) can cause symptomatic varicose veins (vvs) in the perineum and thigh. Presentation, symptom severity, and response to treatment of PVI source vvs are not well defined. Current lower extremity vein specific physician and patient generated disease and quality of life scales may not be applicable tools to assess disease severity in these patients. The purpose of this study was to collect symptoms, demographics, and pain scales in women with PVI vvs, and to compare these data to a population of women with non-PVI related vvs.
METHODS: Female patients with symptomatic PVI source vvs were prospectively followed. Age, weight, height, and number of births, and birth weights of offspring were recorded. Duplex ultrasound scans verified PVI vvs and assessed for saphenous incompetence. Patients were queried as to their primary symptoms, activities that made their symptoms worse, and time when their symptoms were most prominent. Venous Clinical Severity Scores (VCSS) and 10-point visual analog pain scales (VAPS) were obtained. Correlations between VCSS, age and VAPS were made using Pearson product moment correlations. Demographics from these patients were compared to all female patients presenting with vvs using two tailed t-tests. Mean birth weights of offspring in women with PVI source vvs were compared to US population mean birth weights using a single tailed t-test.
RESULTS: 52 patients were enrolled in 14 months. Compared to non-PVI vv patients(n=382), PVI source patients were younger (mean=45 compared to 51, p=.00005), with lower BMIs (mean BMI=21.6 compared to 25.7, p<.00001), and had larger babies (mean birth 3715 g compared to US population mean of 3389 g p<.0001). The most common symptoms were aching (65%), throbbing (44%), and heaviness (29%). In premenopausal patients, 77% noted symptoms were worst during menses. VAPS varied from 0-8 (mean=4.6). The correlation between VCSS and VAPS (r=0.19, p=0.09) was weak. There was a strong correlation between older age and decrease in VAPS (r=-0.44, p=.0005).
CONCLUSIONS: Women with PVI vvs are a unique subset of patients with venous disease. They are younger and thinner than non-PVI vv patients, have larger infants than the general US population, and have an inverse correlation between age and pain. This may be due to hormonal influences as the majority of premenopausal patients have increased symptoms during menses. The commonly used VCSS is a poor assessment tool for PVI patients.

1:20 PM – 1:35 PM
1-2 5 Year Results Of A Randomised Clinical Trial Comparing Concomitant And Sequential Phlebectomy Following Endovenous Laser Ablation
J. El-Sheikha, S. Nandhra, T. Wallace, N. Samuel, D. Carradice, I. Chetter; Academic Vascular Unit Hull, Hull, United Kingdom

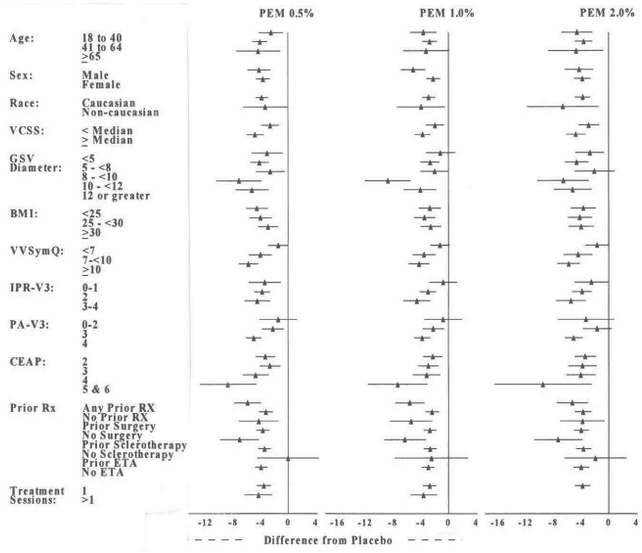
BACKGROUND: Concomitant ambulatory phlebectomy with endovenous laser ablation (EVLA) for great saphenous vein (GSV) incompetence has been shown to reduce secondary procedures and improve quality of life (QoL) when compared to EVLT alone at one year. This study aims to assess the 5 year outcomes of EVLA with concomitant or sequential ambulatory phlebectomy
METHODS: Patients undergoing EVLA for primary sapheno-femoral junction (SFJ) incompetence with GSV reflux were randomised to receive EVLA alone (EVLA) or EVLA with concomitant phlebectomies (EVLA-AP). EVLA was performed as a daycase procedure under tumescent anesthesia and duplex ultrasound (DUS).
Follow-up assessments were performed at 1, 6, 12, 52, 104, 260 weeks.
Outcomes measures were
•Secondary procedures,
•Clinical outcomes (recurrence, CEAP, VCSS),
•Duplex GSV reflux
•Disease specific quality of life (QoL) using the Aberdeen Varicose Vein Questionnaire (AVVQ)
RESULTS: 50 patients were equally randomised to receive EVLA or EVLA-AP. One patient withdrew from the EVLA group. EVLA n=24 (20 Female: 4 Male, Mean age (S.D.) 52.5 (15.6) Median VCSS (I.Q.R) 4 (2-5) median CEAP (I.Q.R) 2 (2-2); EVLA-AP n=25 (8 Male:17 Female, mean age (S.D.) 51.1 (14.3) median VCSS (I.Q.R) 4 (2.25-5) median CEAP (I.Q.R) 2 (2-3.75)
All patients successfully underwent their allocated procedure.
Follow-up at 5 year for EVLTAP was 84% (n=21) and EVLT was 75% (n=18).
There was no significant difference after 1 year in the requirement for secondary procedures (EVLA 7 secondary procedures & EVLA-AP 5 secondary procedures, p=0.520).
Intra-group analysis demonstrated significant clinical improvement in both groups over the 5 years, however there was no significant intergroup differences in clinical recurrence rates (p=0.725), CEAP grades (p=.661), VCSS (p=0.581), or AVVQ (p=0. 835).
CONCLUSIONS: 5 year follow-up demonstrates that the initial benefits of performing concomitant ambulatory phlebectomy are not sustained into the long term. There is no significant difference between clinical or quality of life outcomes. This evidence may suggest that phlebectomies can be performed as per patient and surgeon preference.

1:35 PM – 1:50 PM

1-3 An Integrated Subgroup Analysis Of The Effect Of Treatment With Polidocanol Endovenous Microfoam On VVSymQ™ Score In Patients With Varicose Veins

E. F. Evans[1], C. Daugherty[2]; [1]BTG International Ltd, West Conshohocken, PA, [2]BTG International Ltd, West Conshohocken, PA

BACKGROUND: Polidocanol endovenous microfoam (PEM), a low-density injectable microfoam, is being studied for comprehensive treatment of the symptoms and appearance of varicose veins caused by saphenofemoral junction (SFJ) incompetence. In 2 randomized, blinded, multicenter trials (VANISH-1 and VANISH-2), the primary efficacy endpoint was symptom improvement as measured by the VVSymQ™ Score, a patient-reported outcome measure. Here we describe the results of a subgroup analysis of VVSymQ™ treatment effect at Week 8 for PEM and placebo in these studies.
METHODS: Patients were equally randomized to receive placebo or PEM (0.125% [control], 0.5%, 1.0%, or 2.0%) in VANISH-1 (N=275); or 1 of 3 dose concentrations (0.125% [control], 0.5%, or 1.0%) in VANISH-2 (N=232). Subgroup analyses evaluated change from baseline to Week 8 in VVSymQ™ for PEM 0.5%, 1.0%, and 2.0% based on patient demographics, great saphenous vein (GSV) diameter, baseline symptom severity, appearance (measured by IPR-V3, and PA-V3), VCSS scores, and former treatment history.
RESULTS: Figure 1 illustrates VVSymQ™ treatment effect at Week 8 by subgroup. VVSymQ™ efficacy results were consistently robust and in favor of all therapeutic PEM doses compared to placebo in all subgroups. Minor differences in the magnitude of treatment effect between subgroups were often due to small sample sizes or variable placebo effects. PEM patients with higher CEAP classifications had the largest improvement in symptoms relative to placebo, as did patients with GSV diameters of 10 to <12 mm, followed by those with GSV diameters >12 mm. Therefore, PEM was shown to be an effective treatment for a wider range of vein sizes and morphologies than are currently recommended for endovenous thermal ablation (ETA). As baseline VCSS, VVSymQ™, IPR-V3, and PA-V3 scores increased, there was greater improvement in VVSymQ™ scores at Week 8. Additionally, a large difference between the pooled PEM and placebo groups was seen in patients who received prior sclerotherapy.
CONCLUSIONS: PEM treatment effects were consistent across all subgroups as measured by the VVSymQ™ score. Generally, patients with more severe chronic venous insufficiency at baseline who received PEM achieved the greatest improvement. All analyzed subgroups benefitted from PEM treatment.
Figure 1: VVSymQ™ Treatment Effect at Week 8 (LOCF) by Subgroup: Difference from Placebo with 95% Confidence Intervals



1:50 PM – 2:05 PM

1-4 Predictive Value Of A Preoperative Test For The Reversibility Of The Reflux After Phlebectomy With Preservation Of The Great Saphenous Vein

S. Chastanet, P. Pittaluga; Riviera Veine Institut, Monte Carlo, Monaco

BACKGROUND: Evaluation of the value of a test of reversibility (TR) of the reflux of the great saphenous vein (GSV) in order to forecast the result of phlebectomy with preservation of a refluxing GSV according to the principles of the Ambulatory Selective Ablation of Varices under Local anesthesia (ASVAL).
METHODS: We have prospectively included the patients operated on by ASVAL for unilateral varicose veins with a reflux of the GSV and for whom a TR was feasible. The TR was considered as positive if the reflux of the GSV was completely abolished by compression of a varicose tributary at the moment of the sudden release of manual compression on the calf, during a duplex-ultrasound examination performed with the patient standing upright.
The presence of a reflux of the GSV, the symptoms relief and the cosmetic improvement were evaluated at 1 and 2 years of follow-up (FU).
RESULTS: A total of 293 lower limbs (LLs) in 249 patients have been included. The TR was positive in 165 LLs (56.3%). At 1 and 2 years of FU after ASVAL, a reflux of the GSV was less frequently observed in LLs for which the TR was positive preoperatively (respectively 4.3% vs 11.2% P=0.04 and 5.3% vs 14.1% P=0.02). On the other hand, at 1 and 2 yrs of FU the preoperative positivity of the TR did not have any correlation with the symptoms relief (12.9% vs 15.3% P=0.59 and 13.6% vs 20.7% P=0.16) or the

cosmetic improvement (5.7% vs 9.2% P=0.30 et 6.8% vs 10.9% P=0.28) after treatment. The positive predictive value of the TR for the abolition of reflux of the GSV was 95.7% and 94.7% at 1 and 2 years of FU.
CONCLUSIONS: The preoperative positivity of the test of reversibility of the GSV reflux was correlated with an hemodynamic improvement of the GSV at 1 and 2 years of follow-up after ASVAL, with a high positive predictive value.

2:05 PM – 2:20 PM
1-5 Significance Of Patent Saphenous Vein Stump Length After Endothermal Ablation
J. E. Genut, W. A. Marston, A. E. Kouri; University of North Carolina, Chapel Hill, Chapel Hill, NC

BACKGROUND: Endothermal Ablation (ETA) of the great saphenous vein (GSV) carries a small but real risk of Endovenous Heat Induced Thrombus (EHIT). There remains debate over the optimal positioning of the ablation device within the GSV. Our research aims to determine whether the length of patent proximal GSV after ETA affects hemodynamic improvement, symptomatic relief, or midterm durability of ETA.
METHODS: We retrospectively reviewed a database of 922 ablation procedures performed from 2003 - 2012 to identify patients with a patent proximal great saphenous vein stump of 4 cm or greater on initial evaluation within 1 month of ETA. These patients comprised the long saphenous stump (LSS) group which was compared to the short saphenous stump (SSS) group consisting of those with a patent saphenous stump < 4 cms. All patients were evaluated with preoperative and postoperative duplex ultrasound and air plethosmogrophy (APG) measurements of venous filling index (VFI). All LSS patients were monitored for symptom recurrence with a mean follow up of 20.5 months (0.3 - 84 months).
RESULTS: Thirty-nine patients were identified with a LSS after ETA. The length of GSV patency from the SFJ in the LSS group varied from 4 cm to 15 cm (mean length 7.1 cm). There was no correlation in the LSS group between percent reduction in VFI and distance of patent proximal GSV ($r^2 = 0.0073$). A *t*-test was utilized to compare hemodynamic improvement in patients in the SSS group with those in the LSS group. There was no significant difference in the improvement of VFI after ETA in the LSS group compared to the SSS group ($P < 0.001$). Recurrence occurred in 6 of 39 limbs (15%) in the LSS group at an average of 27 months after ETA (1 - 84 months).
CONCLUSIONS: In this patient cohort, the length of patent great saphenous vein stump did not correlate with degree of hemodynamic improvement or durability of symptom relief after ETA at mid-term follow-up. Recurrence occurred in 15% of patients in the LSS group, consistent with published recurrence rates for ETA. These results suggest the placement of the ablation device may be positioned farther away from the SFJ than is currently recommended with acceptable results. Longer-term follow up is still required to determine the optimum location for the ablation device within the saphenous vein.

2:20 PM – 2:35 PM
1-6 12 Months Follow-up Of The European Multicenter Study On Cyanoacrylate Embolization Of Incompetent Great Saphenous Veins
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BACKGROUND: Endothermal saphenous ablation requires the use of perivenous tumescent anesthesia and postinterventional compression stockings, moreover, causing paresthesia in 5%-10% of patients. An embolization technique lacking these needs and complications would significantly improve treatment. The primary endpoint of the study was evaluation of closure of the GSV at 6 months; however, all patients will be followed to 2 years. We report herein one-year follow-up.
METHODS: A prospective multicenter cohort study was conducted in seven European centers between 12/2011 and 07/2012. Incompetent Great Saphenous Veins (GSVs) received endovenous embolization with a unique endovenous cyanoacrylate (CA) adhesive implant. Neither tumescent anesthesia nor post-interventional compression stockings were used. Varicose tributaries remained untreated for 3 months. Duplex ultrasound and clinical examination were performed at 2 days and after 1, 3, 6 and 12 months.
RESULTS: Seventy GSVs in 70 patients were treated, follow-up to 1 year was completed in 60 (86%) patients. All treatments were successful. Partial recanalization with open vein segments longer than 10 cm on duplex ultrasound occurred in 1 patient at 24 hours, in 2 patients at 3 months and in one additional patient at 6 months. No additional late recanalization was observed at 12 months follow-up. Life-table occlusion rates were 98.6% at 2 days (95%-CI:95.8-100%), 95.7 % at 3 months (95% CI: 91.1-100%) and 94.3% at 6 months (95% CI: 89.0-99.9%). Phlebitis occurred in 6 cases (8.7%), 5 of whom received NSAIDs for an average of 7 days, no SAEs were observed. Average VCSS improved from 4.3 ± 0.3 at baseline to 0.96 (±1.18) at Month 6 (n=70) and 1.13 (±1.27) at month 12 (n=62) (p<.0001 for all post-procedure time points compared to baseline).
CONCLUSIONS: Transcatheter endovenous CA adhesive for closure of insufficient GSVs proved to be feasible, safe and effective without the use of sedation, tumescent anesthesia or compression stockings. Side effects were mild, in particular paresthesia was not observed. Long-term effectiveness appears high, with no late failures between months 6 and 12.

2:35 PM – 2:42 PM
Q1-1 Saphenous Vein Radiofrequency Ablation Employing Enhanced Leg Elevation
R. F. Merchant, J. W. Daake, K. S. Richards, J. S. Frisbie; The Reno Vein Clinic, Reno, NV

BACKGROUND: Treatment of a symptomatic incompetent saphenous vein is routinely accomplished using radiofrequency ablation (RFA). Treatment efficacy is dependent upon, among other factors, effective exsanguination of the target vein. Trendelenburg positioning is often used to facilitate emptying the vein. However, the angle of torso inversion is limited to approximately 15° due to patient stability in a head down position. In November 2007, our clinic implemented a technique whereby the patient's leg was elevated

to a consistent 30° angle while maintaining the torso horizontal, thus achieving enhanced vein emptying.
METHODS: Patient records for treatments prior to (May-October 2007; Group 1) and subsequent to (November 2007 - December 2012; Group 2) implementing the enhanced vein drainage technique were retrospectively analyzed for outcomes. The VNUS Medical Technologies (Covidien, San Jose CA) ClosureFast™ catheters were used for all treatments.
RESULTS: Table 1 summarizes the patient demographics. Incomplete vein obliteration at first post-operative ultrasound was observed in one of 105 (1.0%) treatments in Group 1 (G1), compared with two of 895 (0.2%) in Group 2 (G2), (p=NS). Documentation of an early first post-op ultrasound was lacking for one G2 patient. For outcome analysis, treatments for which an ultrasound follow-up examination was not performed beyond one month were excluded. Results are shown in Table 2. As would be expected since the G2 patients were treated more recently than the G1 patients, the months of follow-up were skewed toward a shorter interval in G2. In November 2009, we altered our technique from performing two heating passes in the proximal vein segment to a single pass. In comparing G2 treatments that received proximal vein double heating (n=161) to the G1 technique having a similar proximal heating protocol, it was found that one of the six G2 recanalizations occurred in this sub-group (p=.0404). The difference in outcomes between the G2 sub-groups, 1/161 (0.6%) vs. 5/356 (1.4%), was not significant.
CONCLUSIONS: An analysis of our clinical experience, although retrospective in nature, suggests that using enhanced leg elevation during saphenous vein RFA, by facilitating exsanguination, may be an effective technique to achieve durable vein obliteration.

Table 1: Patient Demographics

	Treatment Group	
	Prior to enhanced drainage (G1)	With enhanced drainage (G2)
No. of treatments	81	646
No. of patients	68	490
Female gender (%)	88.9	76.2
Age (mean)	50.0	50.0
BMI (mean)	27	26
CEAP category		
2	43 (53.1%)	314 (48.6%)
3	17 (21.0%)	189 (29.3%)
4	19 (23.5%)	126 (19.5%)
5/6	2 (2.5%)	17 (2.6%)

Table 2: Vein status at last follow-up

	Treatment Group	
	Group 1	Group 2
No. of veins with follow-up >1 month	49	517
≤12 month follow-up	36 (73.5%)	478 (92.5%)
Recanalized vein	3 (6.1%)	6 (1.2%) (p=.0353)

2:42 PM – 2:49 PM

Q1-2 Venous Reflux Duplex Ultrasound Objective Structured Assessment Of Technical Skills (V-DUOSATS)

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BACKGROUND: There is currently no accepted, validated and reliable assessment tool for duplex assessment of Venous Reflux which is required for formative assessment as well as revalidation. Our main objective was to develop a reliable and valid assessment tool for Duplex assessment of Venous Reflux.
METHODS: Medical students, Junior doctors, Specialist Registrars and Vascular Scientists and Trainees from Imperial College NHS Trust were invited to participate in this study. The participants were grouped based on their previous duplex venous ultrasound experience. After watching a standardized instructional video demonstrating assessment of venous reflux, participants familiarized themselves with the portable duplex machine used for the study. Participants were then asked to assess an incompetent vein in the Axiom vascular flow simulator. Video clips were recorded for independent analysis by three experts in vascular ultrasound. All videos were scored on the v-DUOSATS tool. For these simulator based assessments, a modified v-DUOSATS which excluded patient positioning was used. An overall rating was also made and scored between 1 and 4 on a nominal scale (1, clear fail; 2, borderline fail; 3, borderline pass; 4, clear pass). The specific parameters of the v-DUOSATS tool used were, Transducer selection, Ultrasound coupling gel usage, Image optimisation in B mode, Acquisition of SFJ image, Evaluation of reflux in color and Reflux time assessment using spectral Doppler.
RESULTS: There were 24 participants (novices = 10, intermediate = 7, experts = 7). Analysis showed that there was no inter-group difference in selecting the correct transducer, use of ultrasound coupling gel and acquisition of SFJ imaging. There was a significant difference when the experts were compared independently against the novice and intermediate groups in identifying image optimisation in B mode (p = 0.004) and assessing reflux time using spectral doppler (p = 0.022). There was no difference noticed between novices and intermediate groups. The experts performed better than the novice and intermediate groups in evaluation of venous reflux in color, however statistical significance was borderline (p=0.056). Better performance of experts in assessment of specific parameters including image optimisation in B mode in our simulator, correlates with their previous experience.
CONCLUSIONS: We have developed a novel Objective Structured Assessment of Technical Skills for Duplex venous reflux assessment comprising of a sophisticated vascular flow model simulating venous reflux. This pilot study demonstrates the accuracy of v-DUOSATS and the flow model in predicting an individual's experience of performing duplex venous scans, therefore it may be useful in training and should be required for both formative and summative assessment as well as revalidation.

2:49 PM – 2:56 PM

Q1-3 12 Month Experience Using Reprocessed ClosureFast Radiofrequency Catheters

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BACKGROUND: The VenefitTM Procedure using the Covidien ClosureFastTM Catheter is a single use method to treat superficial venous reflux. In November 2011, Northeast Scientific, Inc. (NES) received FDA clearance of its 510(k) application for clinical use of reprocessed ClosureFAST catheters. This is a 12 month experience comparing single use ClosureFAST catheters(SU) with NES-reprocessed ClosureFAST catheters (RC)

METHODS: From August, 2012 to July, 2013, 302 patients with primary superficial venous reflux were treated in an outpatient vein center by a Phlebologist. Patients were treated using the manufacturer's recommended protocol. Primary outcome was complete ablation of the treated vein confirmed by color flow duplex Doppler ultrasound examination around two weeks following the procedure, and at six months. Secondary outcomes were complications, and VCSS scale. Cost savings using the reprocessed catheters was also calculated.

RESULTS: 302 consecutive patients had RFA performed for primary superficial venous incompetence, and a total of 595 procedures were completed: 198 using the single use ClosureFAST catheter, and 397 using the NES-reprocessed ClosureFAST catheters.

In the group of SU catheters, 160 had Great Saphenous vein ablation (160 GSV); 35 had Small Saphenous vein ablation (35 SSV); and 3 had Accessory vein ablation (3 AV). At two weeks, all of the primary and accessory veins were ablated in 153 patients who returned for evaluation, and at six months all of the primary and accessory veins were ablated in 49 patients who returned for evaluation. There were 4 deep venous thrombosis (2 EHIT, 1 gastrocnemius thrombosis, 1 femoral-popliteal thrombosis) and there was one inflammatory response treated/resolved with Bactrim-DS. The VCSS score pre-operative was 5.37, two weeks was 2.62, and six months was 1.77.

In the group of RC, 314 had Great Saphenous vein ablation (314 GSV); 77 had Small Saphenous vein ablation (77 SSV); and 6 had Accessory vein ablation (6 AV). At two weeks, all of the primary and accessory veins were ablated in the 301 patients for evaluation, and at six months all of the primary and accessory veins were ablated in the 93 patients who returned for evaluation. There were 4 deep venous thrombosis (no EHIT, 3 gastrocnemius thrombosis, 1 popliteal thrombosis), and there were 3 inflammatory response treated/resolved with Bactrim-DS. The VCSS score pre-operative was 5.97, two weeks was 3.03, and in six months was 2.34.

Cost savings of $178/procedure (total $70666) was realized in 12 months.

CONCLUSIONS: Similar performance outcomes are seen using the single use Covidien ClosureFASTcatheter and the NES-reprocessed ClosureFAST catheters, with significant cost savings using RC.

2:56 PM – 3:03 PM

Q1-4 The Effects Of Altitude, Temperature, Gas To Sclerosant Ratio, Air Vs. 50:50 Mixture Of CO2 And O2, Foam Volume, Presence Of Silicone And Consecutive Uses Of Syringes On The Longevity Of Tessari-made Foam For Sclerotherapy

S. B. Patel, A. E. Ostler, T. M. Pirie, M. S. Whiteley; The Whiteley Clinic, Guildford, United Kingdom

BACKGROUND: Tessari made Foam Sclerotherapy is a popular treatment of Varicose Veins. This procedure is performed around the world in variety of clinics differing in methods, equipment, temperatures and altitudes. We investigated how the following factors affected the foam longevity: silicone vs. non-silicone syringes, the volume of foam made, the ratio of gas: sclerosant, the use of air vs. 50:50 mixture of CO2 and O2, temperature, altitude and 10 consecutive reuses of the syringes. To study the effect of altitude (and hence pressure), we performed experiments at several stations at different altitudes on a mountain.

METHODS: Sclerosant foam was made using the Tessari double syringe technique. To calculate the longevity, the time was taken for half of the original volume of Sclerosant to settle. Half-lives were compared when using silicone and silicone-free syringes to make the foam. We investigated how the volume (5ml vs. 2ml) and different ratios affected the foam by observing the half-life of 4:1, 3.5:1 and 3:1 ratios of gas to sclerosant. Air and a 50:50 mixture of CO2 and O2 were both used as the gas when changing the ratio and volume, to see which produced better foam. These experiments were conducted at room (23.9°C) and refrigerated temperatures (3°C) with a constant pressure. The different ratio, volume and silicone vs. non-silicone syringe experiments were all repeated at 9314, 7460, 4575 and 2326 feet above sea level in addition to the baseline experiment which took place at 236 feet above sea level. To test how consecutive uses of syringes affected the foam, we made consecutive batches of foam reusing each pair of syringes 10 times - this was repeated 5 times with silicone syringes and twice with non-silicone.

RESULTS: Switching to non-silicone syringes can increase longevity by 70%. A larger volume of foam and a 3:1 ratio produced longer half-lives at all temperatures and altitudes. The lower (3°C) temperature increased the longevity of foam in all instances as did the use of air. A high altitude (low pressure) had a detrimental effect on the foam longevity. Ten consecutive syringe uses had no significant impact on the foam half-life (silicone syringe mean between first 5 and last 5 uses, p=0.95).

CONCLUSIONS: The optimum conditions for making foam are non-silicone syringes, a 3:1 air: sclerosant ratio and low temperatures. Silicone syringes can be re-used till friction becomes a burden. Temperature has a bigger effect than altitude on foam longevity. Making foam in larger volumes would allow the foam to last longer. To compensate for high altitudes (low pressures), decreasing the temperature will increase the foam longevity.

3:03 PM – 3:30 PM

Coffee Break ..... Crescent City Ballroom

3:30 PM – 5:30 PM

SCIENTIFIC SESSION 2..... Roosevelt Ballroom

Chronic Venous Obstructions 1

Moderators: Jennifer Heller, MD, M. Ashraf Mansour, MD

3:30 PM – 3:50 PM

2-7 Initial In-vivo Evaluation Of Safety And Performance Of Nitinol Venous Stent In A Large Ovine Animal Iliac Venous Model

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BACKGROUND: In both acute and chronic venous situations, patients with obstruction of the iliofemoral venous system are considered for stenting which has become an accepted therapy for this situation. However, currently used stents were primarily designed for biliary or arterial indications and are likely not optimal for use in the venous system. The aim of this study was to evaluate the safety and performance of a new nitinol venous stent (NVS) designed specifically for venous applications in an in vivo venous model.

METHODS: The study evaluated vascular response and safety of the NVS compared to the Wallstent Stent (WS, Boston Scientific) at baseline and 56 and 180 days. Eight adult sheep (N=4 at 56D; N=4 at 180D) underwent bilateral iliac vein stenting using a single NVS on one side and a single WS on the other. Fluoroscopy and intravascular ultrasound (IVUS), which measured diameters throughout the target vessel bilaterally, were performed at implantation to identify iliac vein diameters at baseline, and again at 56D and 180D. In addition, both iliac veins from all 56D and 180D animals (N=16) were submitted for histologic examination for intimal strut coverage, luminal thickening, thrombus, and evidence of venous injury.

RESULTS: Stent placement was successful to within 1 cm of the pre-selected location in all animals for both the NVS and WS at 56D and 180D. During follow-up, no clinical evidence of stent thrombosis or obstruction occurred in any limb. Sections of the stented vein at 56D and 180D exhibited complete or near complete endothelial cell coverage, no or minimal luminal thrombus, and virtually complete neointimal coverage of every strut. Little inflammation or evidence of venous injury was observed. Using both the WS and NVS, iliac vein diameters increased immediately after stenting. At 180 days there was no difference in iliac vein diameter or percent change in diameter compared to immediate post-stenting diameters as measured by both venography and IVUS (Table 1).

CONCLUSIONS: In an ovine iliac vein model, a new NVS studied to 180 days was found to be free of thrombotic complications and significant luminal stenosis. These data support clinical evaluation of this NVS in appropriately designed human clinical trials.

Table 1. Percent change in vessel diameter from immediately after stent insertion to 6 months after stent insertion for NVS and WS by IVUS and fluoroscopy.

	NVS	WS	t-test
IVUS	+12.3 + 5.4%	+8.5 ± 14%	0.168
Venogram	-2.4 + 7.1%	-11.0 ± 14.0%	0.166

3:50 PM – 4:10 PM

2-8 Assessment Of Post-operative And Post-intervention Remodeling With Dynamic CT-venography After Treatment Of Chronic Venous Obstructions: Important Observations

C. W. K. P. Arnoldussen, R. Kurstjens, M. A. F. de Wolf, R. de Graaf, M. Das, C. H. A. Wittens; Maastricht University Medical Centre, Maastricht, Netherlands

BACKGROUND: Chronic venous obstruction(CVO) can result in disabilitating disease, identified by leg swelling, venous claudication and (recurrent) venous ulcers. In clinically severe cases, recanalization and stenting of the obstructed deep vein tract has been proven to have the potential to improve these patients symptoms and quality of life. However, in very extensive cases, the occlusion extends below the inguinal ligament, involving the deep vein confluence at the level of the common femoral vein (CFV). For these patients additional treatment, endophlebectomy of the CFV and an AV-fistula, is required to establish adequate inflow into the stented iliac tract while ensuring sufficient drainage from the venous system of the leg. Due to the high-flow caused by the AV-fistula, in altered anatomy, accurate post-operative evaluation with duplex is often impossible. This evaluation is important, because the AV-fistula can cause intimal hyperplasia, a finding necessitating occlusion of the AV-fistula. Dynamic CT-Venography (d-CTV) is not hampered by high-flow or anatomic changes and can potentially aid in evaluating these treatments.

METHODS: 10 patients treated with endovascular recanalization of the iliac venous tract and surgical endophlebectomy of the CFV, followed by creation of an AV-fistula in the groin, where evaluated with d-CTV. The d-CTV protocol allows for near real-time evaluation of the blood flow through the groin and assessment of the remodeling of the lumen in the endophlebectomy and the landing zone of the iliac stent.

RESULTS: In 10 patients d-CTV was performed 2 to 6 months post-operative. One patient showed occlusion of the stented iliac tract, 1 patient an in-stent restenosis (Figure 1). In 6 patients a luminal narrowing was seen in the endophlebectomy (Figure 2), in 2 cases focal (< 1 cm), in 4 cases a longer segment (2-4 cm). In 2 patients the AV-fistula was connected at the level of the distal landings zone of the stent. In these patients no signs of stenosis were identified.

CONCLUSIONS: d-CTV allows for adequate assessment of post-operative/post-intervention evaluation of treated CVO. When the AV-fistula is connected distally in the endophlebectomy, the vein lumen shows signs of severe thickening suggestive of intimal hyperplasia, causing restenosis which obstructs the outflow from the deep veins of the leg. This seems related to the location of the venous anastomosis of the AV-fistula since patients with more proximal anastomosis (in-stent) showed no signs of stenosis of the endophlebectomy or stents.

Figure 1: In-stent stenosis (arrow) after endovascular recanalisation and stenting of the iliac tract and common femoral vein

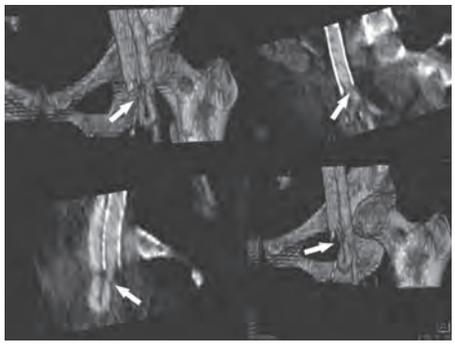
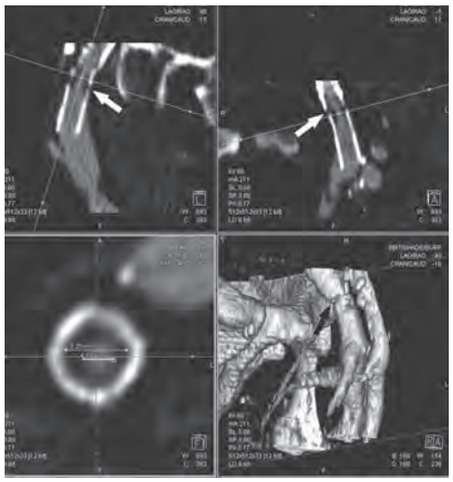


Figure 2: Stenosis (arrow) of the common femoral vein after endoflebectomy with AV-fistula creation.



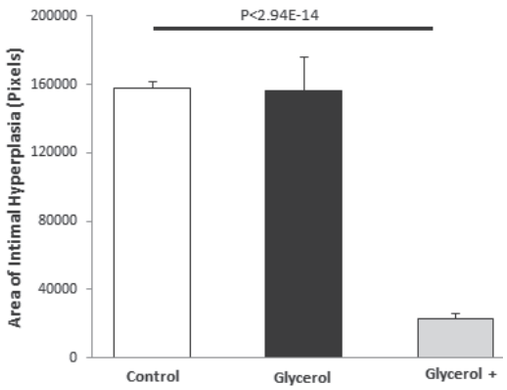
4:10 PM – 4:30 PM

2-9 Nanoparticle-Mediated Gene Delivery via Balloon Angioplasty to Suppress Intimal Hyperplasia

J. R. DiRito, S. Tharakan; Academy for Medical Science Technology, Hackensack, NJ

In the United States alone, over 200,000 cardiovascular surgical procedures utilizing venous grafts fail annually, primarily due to restenosis caused by the physiological healing response known as intimal hyperplasia (IH). IH can be attributed to endothelial cell proliferation, narrowing the walls of the blood vessels through the role of key genes Pdx1 and VEGF-A. Pdx1 is a homeobox whose promoter can induce over expression of VEGF-A, a gene which allows for the growth of the intima. While many genetic therapies work in vitro, targeted delivery in vivo often proves infeasible, rendering such therapies unusable. It was hypothesized that genes that could interfere with IH could be contained within nanoparticles and coated onto a surgical balloon in order to specifically and efficiently target the region of interest. shRNA-regulated knockdown of Pdx1 delivered to a rat carotid artery via nanoparticles could lower the expression of VEGF-A, thereby preventing endothelial growth, the development of a neo-intima and ultimately occlusion. SEM, TEM, fluorescence and confocal light microscopy, and rtPCR were used in the analysis of samples to assess the extent of IH and levels of VEGF-A. Significant results ($p < 1.0$ E-14) support the proposed hypothesis. While intimal hyperplasia was the model chosen for study in this experiment, further research hopes to apply the method to various venous and arterial conditions.

Figure 1: Quantification of Intimal Hyperplasia



4:30 PM – 4:50 PM

2-10 Relative Importance Of Iliac Vein Obstruction In Patients With Postthrombotic Femoral Vein Occlusion

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BACKGROUND: Patients with femoral vein occlusion rapidly develop collateral flow through the deep femoral vein, an embryonic collateral. In contrast, iliac vein collateralization is sparser and functionally poorer. It is not uncommon to have femoral vein occlusions associated with iliac vein obstruction even though the former is often more readily apparent venographically, while the latter may remain occult. We examined if percutaneous stent correction of iliac vein obstruction associated with femoral vein occlusions would yield symptomatic relief. This is of some practical importance as femoral vein occlusions currently require open surgical correction (Husni bypass).
METHODS: 39 patients with femoral vein occlusions underwent stenting of associated iliac vein stenoses over a 13 year period.
RESULTS: Median age was 51 (17-86). Male/Female and Right/Left ratio were 1:3 and 1:2 respectively. CEAP: C 0-2 (with pain)=5%; C3=48%; C4=26%; C5=3% and C6=18%. Concurrent ablation of a refluxive saphenous vein was performed in 18%. Median iliac vein stenosis was 80% (13% - 100%). Primary and primary assisted patency at 2 years was 89% and 93% respectively. Pain Grade (VAS, 0-10) improved from median 5 (0-9) to 3 (0-8) after stenting (P<0.03); 12% were completely relieved of pain. Cumulative improvement in pain (≥3/10 VAS) was 87% at 2 years. Median swelling (Grade 0=none, 1= pitting, 2= ankle edema, 3= gross) improved from median 3 (0-3) to 2 (0-3) (P =0.09). 7/22 limbs with pre-stent swelling of Grade 3 improved (≥ 1 grade) after stent placement; In the 15 limbs with residual Grade 3 swelling post-stent, improvement in duration severity (VCSS scale) was reported by 53%. 4/7 (54%) of active ulcers healed. There were no malsequelae after concurrent saphenous ablation. Saphenous flow in the erect position was median 0.62 (0.06-1.45) ml/sec in 8 limbs where this was measured compared to 1.2 (0.2-2.2) ml/sec in 11 CVD limbs (controls) without femoral vein obstruction.
CONCLUSIONS: Percutaneous stenting of associated iliac vein obstruction in symptomatic limbs with femoral vein occlusion yields satisfactory clinical relief. Less modest improvement in swelling however occurs either because the popliteal-profunda connection offers a higher resistance to flow (incomplete relief of peripheral hypertension) or because femoral vein occlusion is indicative of extensive postthrombotic disease involving popliteal-crural veins, the deep femoral vein or both. Saphenous vein has little collateral role in this pathology and can be safely ablated if refluxive, in line with prior observations.

4:50 PM – 5:10 PM

2-11 Treatment Of IVC Thrombosis In Patients Undergoing Iliocaval Stenting For Acute Or Chronic Venous Obstruction

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BACKGROUND: Acute and chronic iliocaval obstruction can result in lifelong symptoms, ranging from lower extremity swelling, to venous ulceration, claudication and phlegmasia. While there are a few reports documenting the success of iliocaval stenting to relieve outflow obstruction, very little data exists on the endovascular management of outflow lesions extending into the inferior vena cava (IVC). The purpose of this study is to report our experience with attempted recanalization of thrombosed IVCs during treatment of iliocaval outflow obstruction.
METHODS: We retrospectively reviewed 66 patients with symptomatic iliocaval venous thrombosis who underwent percutaneous venoplasty and stenting between 2008-2012. All patients received intraoperative heparin and were maintained on either coumadin or low molecular weight heparin postoperatively.
RESULTS: Thirty-five (53%) patients undergoing venoplasty and stenting for iliocaval outflow obstruction had thrombus extending into their IVCs. Twelve patients had acute venous thrombosis, 7 chronic, and 16 acute-on-chronic thrombosis. Twenty-seven patients (77%) presented with lower extremity swelling and 13 (37%) presented with pain in addition to swelling. Two patients presented with abdominal and back pain and two were noted to have pelvic congestion. Of the patients with IVC thrombosis, 14 (40%) were identified as having a thrombophilic disorder, with Factor V Leiden being the most common. Eight patients (24%) had May-Thurner iliac vein compression. Fourteen patients (40%) had previously undergone IVC filter placement and, of these, 12 filters had thrombosed. Twenty-nine patients (83%) with IVC thrombosis were treated with pharmacomechanical thrombolysis and 28 patients (80%) also received stents extending into the IVC, 14 (50%) of these bilateral. Of these bilateral stents, 4 were kissing, while 10 were fenestrated. In patients with IVC thrombosis, primary patency for any iliocaval stent at one year was 46% (13/35) and 36% (5/14) for bilateral stents. Of the bilateral stents, for kissing and 30% (3/10) for fenestrated, with secondary patencies of 75% (3/4) and 57% (4/6), respectively. Nine patients (26%) experienced re-thrombosis within 60 days while eight patients (23%) experienced recurrence of thrombosis after 60 days, 5 of whom were also noncompliant with their anticoagulation. The most common perioperative complication was an access site hematoma (14%).
CONCLUSIONS: IVC thrombosis in patients presenting with symptomatic venous outflow obstruction is not uncommon. These patients likely represent a subset of patients more refractory to endovascular treatment, based on higher disease burden, indwelling IVC filters, thrombophilic disease and noncompliance. Despite this, pharmacomechanical thrombolysis and stenting of the IVC appear to be feasible endovascular therapies for patients who otherwise may not have treatment options.

5:10 PM – 5:15 PM

Q2-5 Short-term Clinical Experience With A Dedicated Venous Stent

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BACKGROUND: Deep venous stenting has become the primary treatment option for chronic venous obstructive disease, both for iliac vein compression syndromes and post-thrombotic venous lesions, during the last decade. Until recently only arterial-designed materials were available, no dedicated venous stents were available. These venous stents are characterized by increased length, diameter, flexibility and radial force. Recently 3 such stents have become available. We report our early experience with one such

devices; the Sinus Venous stent (OptiMed, Ettlingen, Germany).
METHODS: Between March 2012 and July 2013 48 patients were treated with the Sinus Venous stent. These included 6 cases of stenting after thrombolysis for acute DVT, 11 cases of stenting for isolated iliac vein compression syndrome (May-Thurner) and 31 cases of stenting for chronic venous obstruction in post-thrombotic syndrome patients. Diagnosis of relevant obstruction was made by use of clinical evaluation combined with duplex ultrasound, magnetic resonance venography and per-procedural venography. Patency control during follow up was assed with duplex ultrasound.
RESULTS: Cumulative patency rate at 3 months was 83%, 84% and 97 % for primary, primary assisted and secondary patency respectively. Differences in patency rate between the subgroups of acute thrombotic, post-thrombotic and non-thrombotic exist, with the latter fairing significantly better. All reocclusions were treated by ancillary treatment modalities; including catheter directed thrombolysis, rePTA, and restenting. Morbidity was low, no clinically relevant pulmonary embolisms occurred, and mortality was nil.
CONCLUSIONS: Short term clinical results using the Sinus Venous stent are excellent, with acceptable morbidity rates, and no mortality. As already reported in other venous stenting series thrombotic lesions have lower patency rates compared to non-thrombotic lesions.

5:15 PM – 5:20 PM

Q2-6 Treatment Of Nutcracker Syndrome With Open And Endovascular Interventions

Y. Erben, P. Gloviczki, M. Kalra, H. Bjarnason, N. Reed, A. Duncan, G. S. Oderich, M. Fleming, R. De Martino, T. C. Bower; Mayo Clinic, Rochester, MN

BACKGROUND: Nutcracker syndrome (NS) is rare cause of hematuria, left flank pain and renal venous hypertension due to external compression of the left renal vein (LRV). We reviewed our experience to better define the role of open surgery (OS) and endovascular interventions (ENDO).
METHODS: Retrospective review of all patients treated for NS with OS and ENDO at our institution between January 1994 and September 2013. Primary outcomes were operative morbidity and mortality. Secondary outcomes included primary and secondary patency, freedom from re-intervention and resolution of symptoms.
RESULTS: Thirty-four patients (27 females) with a mean age of 27.5 years (range: 14-62 years) were treated. The most frequent symptoms were flank pain (94%) and hematuria (71%). NS was confirmed with duplex ultrasound with measurement of LRV diameters and flow velocities (80%), computerized tomography or magnetic resonance venography (88%) and contrast venography with measurement of pressure gradients (68%). Initial treatment was OS in 33 patients and ENDO in one. Distal transposition of the LRV was performed in 24 patients. Adjuncts to optimize renal venous outflow included saphenous vein (SV) cuff in six patients, SV patch in four and both SV cuff and patch in one patient. Five patients had SV patch alone, two had transposition of the left gonadal vein (LGV) into the inferior vena cava (IVC). Two patients had anterior reimplantation of retroaortic LRV. There were no major early complications, renal failure or mortality. Three patients underwent early re-interventions including stenting (2) and open revision (1). All LRVs were patent at discharge. Follow up was 36.3±50.3months. Late re-interventions were performed in nine patients due to LRV stenosis (7), LRV occlusion (1) and recurrence of varicocele (1). Three had LRV angioplasty alone, three LRV angioplasty with stenting, two had open revision, one had coiling of LGV. Six patients underwent additional endovascular re-interventions: 3 due to LRV stenosis, 2 due to LRV in-stent restenosis, 1 due to LGV stenosis. All had angioplasty with stenting. One patient had stent migration into the inferior vena cava that required emergent endovascular stent removal. Primary and secondary patencies at 24 months were 97% and 100%, respectively. Freedom from re-intervention at 12 and 24 months were 73% and 60% respectively. Resolution of symptoms occurred in 26 patients (77%).
CONCLUSIONS: OS, mostly LRV transposition remains a safe and effective treatment for patients with NS and ENDO may be useful to treat restenosis or recurrent symptoms. However, the safety and durability of currently available stents need to be established. Further improvement in patient selection and treatment options in this challenging, young patient population are warranted.

5:20 PM – 5:25 PM

Q2-7 Clinical Correlation Of Anatomical Location Of Nonthrombotic Iliac Vein Lesion

B. Kheyson, A. Hingorani, E. Ascher, A. Ganelin, N. Marks, E. Iadgarova; Total Vascular Center, Brooklyn, NY

BACKGROUND: Nonthrombotic iliac vein lesions (NIVL) is an active area of research. Advantages of intravascular ultrasound (IVUS) allows exact localization of these lesions. We chose to use IVUS to explore the anatomical location of NIVL and correlate it with clinical findings.
METHODS: Over the course of 7 month we have performed 217 ilio-femoral IVUS assisted studies. The average age of examined population was 68 years old (range 22-96 years old, standard deviation +/-14 years), with females (N=141) and males (N=76). Intraoperatively, we have used IVUS (intravascular ultrasound) to measure and record the area of involved iliofemoral veins. The measurement of stenosis was compared with the adjacent non-stenotic iliofemoral veins. If more than 50% cross sectional area or diameter reduction was found via IVUS imaging, it was treated with appropriate balloon size (range 10x40 - 16x60) and stent (12-24 mm diameter by 40-90 mm length).
RESULTS: Total of 233 lesions were identified, with 115 in left lower extremity and 118 in right lower extremity. The CEAP classification score in the LLE were C1: 0, C2: 35, C3: 40, C4: 15, C5: 20, C6: 6; with the most common site being proximal common iliac vein 37.4% (20.86% females and 16.5% males). The CEAP classification score in the RLE were C1: 0, C2: 31, C3: 42, C4: 14, C5: 23, C6: 7, while most common site was middle external iliac vein 31.35% (20.4% females and 11.01% males). The least common site of the NIVL was noted in left lower extremity in the distal external iliac vein 2.6% (2.6% females and 0% males). In the RLE least common site of NIVL was also in the distal external iliac vein 7.62% (5.93% females and 1.69% males). No correlation between age, laterality, gender or CEAP score has been noted.
CONCLUSIONS: This analysis gives an insight into understanding the anatomical location of the NIVL, that are often undiagnosed cause of lower extremity venous diseases. Despite multiple questions yet not answered it gives an insight to clinicians and researchers to guide their treatment and research.

5:25 PM – 5:30 PM

Q2-8 Hemodynamic Role Of Sinus On Venous Valve Performance

W. Tien[1], H. Y. Chen[2], Z. C. Berwick[2], J. Krieger[3], S. Chambers[3], D. Dabiri[1], G. Kassab[2]; [1]Department of Aeronautics and Astronautics, University of Washington, Seattle, WA, [2]Department of Cellular and Integrative Physiology, Indiana University School of Medicine, Indianapolis, IN, [3]COOK Medical®, Bloomington, IN

BACKGROUND: The role of sinus pocket of the venous valve has not been fully understood. To reduce the difficulty of implant procedure, the majority of bioprosthetic venous valve designs do not incorporate a sinus pocket as the native valve. It is hypothesized that the sinus pocket works as a flow regulator to smooth the exit flow pattern, but by carefully choosing the design parameters the prosthetic valves can provide similar flow pattern without the sinus pocket. The aim of this study is to determine the impact of the sinus pocket on the flow dynamics in a prosthetic valve and verify the capability of the proposed prosthetic valve design without the sinus pocket.
METHODS: An in vitro experimental setup was used to simulate the flow inside a venous system at physiological flow conditions. Designs of 5mm and 10mm leaflet length were tested in glass vessel models with and without a sinus pocket. Flow patterns around these valves were visualized by particle image velocimetry (PIV), and high resolution 2-D velocity fields were measured.
RESULTS: Vortex structure out of the valve exit was maintained by the sinus. Flow entrainment because of the jet at valve exit was reduced, and the jet half width was suppressed with the presence of the sinus pocket. The jet width at the valve exit for the 10 mm leaflet length design with sinus was 59% of the case without sinus and was 73% for the 5 mm design.
CONCLUSIONS: The sinus pocket regulates the flow around the valve by smoothing the flow pattern around the valve and maintaining the vortical structure at the valve leaflet tip. For the proposed prosthetic valve design without a sinus pocket, a shorter leaflet is favorable because it can create a more similar flow pattern to the sinus pocket.

6:00 PM – 7:30 PM

Welcome Reception ..... Crescent City Ballroom

7:30 PM – 9:00 PM

Tactile Medical Industry Symposium..... Blue Room

(This Symposium is not part of the official program of the AVF 26th Annual Meeting)

7:00 AM – 8:00 AM

Continental Breakfast ..... **Crescent City Ballroom**
New Member Breakfast with the Board *(New Members Only)* ..... **Orpheum Room**
Intro to AVF Guest Breakfast *(Non Members Only)* ..... **Blue Room**

8:00 AM – 10:00 AM

SCIENTIFIC SESSION 3 ..... **Roosevelt Ballroom**
Venous Thromboembolism/IVC Filters
Moderators: Suresh Vedantham, MD, John Blebea, MD

8:00 AM – 8:20 AM

3-12 Deep Vein Thrombosis, Final Report Of The Prospective Multi-Center Pearl Registry On Endovascular Treatment

A. Amin[1]; L. Blitz[2], M. Garcia[3], R. Lookstein[4], E Simoni[5], P. Soukas[6]; [1]Reading Hospital Health System, Reading, PA, [2]Chilton Memorial, Pompton Plains, NJ, [3]Christiana Care, Newark, DE, [4]Mount Sinai Medical Center, NYC, NY, [5]Penn State Hershey Heart and Vascular Institute, Hershey, PA, [6]Miriam Hospital, Providence, RI

BACKGROUND: To address the limitations of anticoagulation, more aggressive endovascular therapies, such as, pharmacological thrombolysis, and/or percutaneous mechanical thrombectomy have been employed with the objective to achieve early lysis/removal of the thrombotic occlusion to restore flow. Early thrombus resolution also provides the advantage of uncovering an underlying stenosis. Options for addressing stenotic veins include venous angioplasty and/or stent placement. This registry looks at the use and clinical benefit of rheolytic thrombectomy with/without adjunctive therapies in treating DVT.
METHODS: A 2 phase prospective registry capturing patient DVT history, procedural information (including a thrombus score based on venography), clinical events and follow up. Phase 1 patients (N=170) were followed up to 3 months post-procedure to document symptomatic improvement by the SF12 questionnaire while Phase 2 patients (N=201) were followed up to 12 months.
RESULTS: There were 371 patients (35 enrolling centers) treated for DVT including 214 male and 157 female (mean age 52; range 17 to 87) with 11% upper (UE) and 89% lower extremity (LE) DVT. 69% reported symptoms of < 14 days (acute). Adjunctive therapies included lytic delivered by AngioJet (86%), CDT (60%) and stenting (32%). 75% of all cases were completed in <24 hours. There was an overall mean reduction in thrombus of 89% with substantial lysis (≥50%) achieved in 96% of the patients. In the LE cases, the substantial lysis rates for both acute (97%) and chronic (95%) were statistically significant ($p<0.0001$). Bleeding requiring transfusions were minimal (2.2%). QOL analysis showed significant improvement ($p<0.0001$) from baseline through 12 months for both physical and mental measures. Freedom of rethrombosis rates at 90, 180 and 365 days were 94%, 88% and 84%, respectively.
CONCLUSIONS: Aggressive endovascular treatment of DVT using rheolytic thrombectomy combined with adjunctive therapies forms an effective and safe strategy for the comprehensive treatment of DVT, with excellent clinical improvement and freedom from rethrombosis rates.

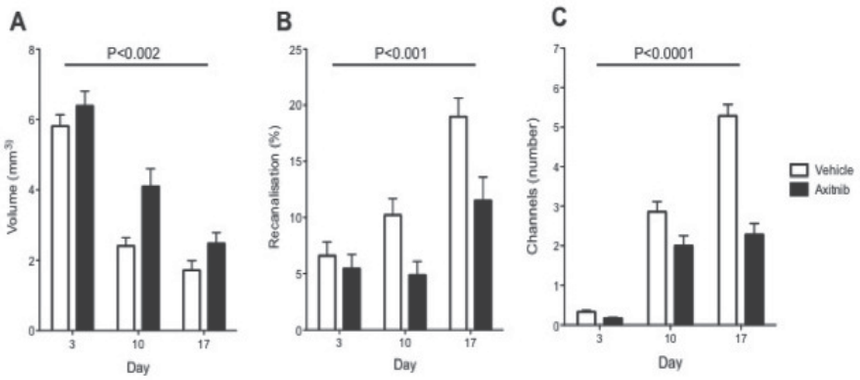
8:20 AM – 8:40 AM

3-13 Axitinib Treatment Impairs Venous Thrombus Resolution

S. P. Grover, A. Patel, P. Saha, O. T. A. Lyons, B. Modarai, J. Humphries, A. Smith; King's College London, London, United Kingdom

BACKGROUND: Tumours are prothrombotic, while venous thromboembolic events are a leading cause of mortality in cancer patients. Venous thrombi resolve through a process of organisation, including the formation of neovascular channels in the thrombus. Use of anti-angiogenic therapy is associated with increased incidence and severity of VTE. The aim was to investigate whether axitinib, a clinically used, selective vascular endothelial growth factor receptor inhibitor, affects resolution of venous thrombi.
METHODS: Thrombus was induced in 48mice (10-12week-old male Balb/c). 24hrs post-induction, either axitinib (25mg/kg), or vehicle control was administered twice daily by intraperitoneal injection. Thrombi were harvested at days 3, 10 and 17 post-induction for histological analysis (n≥6 per group). Haematoxylin and eosin stained sections were used to estimate thrombus volume and recanalisation. CD31 immunohistochemistry was used to identify neovascular channels within the thrombus and picrosirius red staining used to identify collagen as another marker of organisation. Macrophage and neutrophil content of the thrombus was estimated by immunohistochemical staining for Mac-2 and Ly6-G respectively. Measurement of thrombus size, organisation and inflammatory cell content was carried out by image analysis of stained sections. Statistical analysis was carried out by 2-way ANOVA.
RESULTS: Axitinib treatment resulted in impaired thrombus resolution ($P<0.002$), thrombus organisation (both collagen content, $P<0.0001$, and neovascularisation, $P<0.0001$) and vein recanalisation ($P<0.001$) compared with vehicle treated controls. These were associated with reduced thrombus macrophage content ($P<0.0001$).

Figure 1: The effect of axitinib treatment on venous thrombus volume, recanalisation and neovascularisation



CONCLUSIONS: Axitinib treatment impaired resolution of venous thrombi. Inhibition of thrombus neovascularisation is consistent with the role of VEGFR signalling in angiogenesis. These findings complement previous studies in which upregulating thrombus VEGF levels resulted in increased monocyte recruitment and accelerated thrombus resolution. Although anti-angiogenic therapy improves survival in cancer patients, it is important to highlight the prothrombotic potential of this class of drugs. It is possible that inhibition of thrombus resolution by axitinib in this study could account for the increased incidence and severity of VTE in clinical studies.

8:40 AM – 9:00 AM

3-14 Long-term Outcomes and Predictors of Failure of Thrombolysis for Iliofemoral Deep Venous Thrombosis

E. D. Avgerinos, E. Hager, A. Naddaf, E. Dillavou, M. Singh, R. A. Chaer; University of Pittsburgh, Pittsburgh, PA

BACKGROUND: Catheter directed thrombolysis (CDT) with adjunctive mechanical techniques, when successful, are increasingly reported to alleviate symptoms of acute iliofemoral deep venous thrombosis (IFDVT) and prevent the development of post thrombotic syndrome (PTS). This study aims to determine long term outcomes and to identify predictors of immediate and longer term failure in order to aid in better patient selection.
METHODS: Consecutive patients who underwent CDT and/or pharmaco- mechanical thrombolysis (PMT) for IFDVT between May 2007 and March 2013 were identified from a prospectively maintained database. Assessment of immediate failure predictors was based on the degree of clot lysis (≤50% vs >50%) and/or 30 day DVT recurrence. Long-term outcomes were based on ultrasonographic patency of the lysed segments and Villalta score (≥5 vs <5). Survival analysis was used to assess primary patency and PTS morbidity. Univariate and multivariate models were used to determine predictors for the endpoints.
RESULTS: 93 patients (117 limbs, mean age 49.4±16.2, 47 females) with symptoms averaging 11.1±9.6 days were treated with various combinations of CDT and PMT; in 52 (55.9%) at least one stent was deployed. (Table 1) Immediate treatment failure was seen in 14 (15%) patients predicted by preoperative indication “phlegmasia” (OR 3.7, p=.011), malignancy (OR 16.2, p=.04) and recent surgery (OR 7.2, p=.05), but not on technical alternatives or DVT anatomical level. During a median ultrasonographic follow up of 12 months (range 1-65) 6 more patients had an anatomic failure accounting for an overall 3 year primary patency 71.4%. Long term patency was only predicted by the efficiency of lysis (>50%) at baseline (OR 1.83, p<.001). The rate of PTS (Villalta score ^{3}5) at 3 years was 31.3% and was predicted by malignancy (HR=5.0, p=.017), female gender (HR=5.1, p=.011), preoperative indication “phlegmasia” (HR 2.7, p=.005), non-caval involvement (HR 7.9, p=.026) and inefficient lysis (≤50%) (HR=10.5, p=.003).
CONCLUSIONS: Thrombolysis for symptomatic IFDVT can achieve high rates of immediate thrombus clearance and long term PTS morbidity reduction. Inefficient lysis, phlegmasia, malignancy and female gender are associated with a higher risk of long term loss of patency and/or PTS occurrence, while successfully lysed caval involvement is protective.

Table 1: Baseline characteristics and technical aspects of study cohort

	N (percentage)
Patients / Limbs	93 / 117
Mean age (years±SD)	49.4±16.2
Female Gender	47 (50.5%)
Presenting symptom (indication)	
Pain / Swelling	80 (86%)
Phlegmasia	13 (14%)
Duration of Symptoms (days±SD)	11.1±9.6
≤14 days	64 (68.8%)
>14 days	29 (31.2)
Risk factors	
Malignancy	14 (15.1%)
Hypercoagulable disorder	34 (36.6%)
Recent surgery	19 (20.4%)
Previous DVT	27 (29%)
Immobility	12 (12.9%)
Medication (e.g. contraseptives)	2 (2.2%)
Trauma	2 (2.2%)
Clinically Significant PE (on admission)	13 (14%)
DVT involving the Vena Cava	43 (46.2%)
Technique	
Catheter Directed only	8 (8.6%)
Pharmacomechanical only	65 (69.9%)
Combined	20 (21.5%)
Stent use	52 (55.9%)

9:00 AM – 9:20 AM

3-15 The Natural History And Treatment Outcomes Of Symptomatic Ovarian Vein Thrombosis

R. D. Malgor[1], M. Comito[1], A. P. Gasparis[1], P. Pappas[2], A. K. Tassiopoulos[1], N. Labropoulos[1]; [1]Stony Brook University Medical Center, Stony Brook, NY, [2]Brooklyn Hospital, New York City, NY

BACKGROUND: Information on ovarian vein thrombosis (OVT) is limited to retrospective studies that lack good design and evaluation of outcomes. This is the first prospective study to describe the natural history and treatment outcomes of OVT.
METHODS: Patients with documented symptomatic ovarian vein thrombosis that were treated with anticoagulation and had at least 3 month follow up were included. Initial clinical presentation and associated comorbidities were recorded. Outcomes of interest were recanalization rates, pain resolution, pelvic congestion syndrome, recurrent deep vein thrombosis (DVT) and mortality. All patients underwent clinical examination, duplex ultrasound while computer tomographic venography was selectively performed.
RESULTS: There were 23 females with mean age of 44 years (range from 23 to 68). Fifteen (65%) right, 5(22%) left, and 3(23%) bilateral OVTs were detected. The median follow-up was 27 months (range from 3 months to 7 years). All patients were symptomatic. The most common presentation was abdominal pain in 9 (39%) patients followed by flank pain in 6 (26%). A combination of flank and abdominal pain was found in 6(26%) patients. The remaining 2 (9%) patients presented with dyspnea due to pulmonary embolism. All but one patient had an identifiable hypercoagulable state. The most prevalent conditions were puerperium (N=9, 39%) and malignancy (N=6, 26%). All patients were treated with anticoagulation. Complete recanalization was demonstrated in 16(61%) veins, partial in 4(15%) and occlusion in 6(24%). The interval necessary for pain resolution varied from 10 days to 4 months. Four (17%) patients had lower extremity DVT during follow-up after the interruption of anticoagulation. Three (13%) patients developed pelvic congestion syndrome. All 4 (17%) deaths occurred due to cancer-related complications at 8, 25, 34, and 57 months follow-up.
CONCLUSIONS: Symptomatic OVT is rare and most often associated with an identifiable hypercoagulable state. Patients fair well on anticoagulation with recanalization occurring in 76%. Recurrent DVT is found in lower extremity veins after the interruption of anticoagulation in 17% of patients while mortality is seen only in cancer patients.

9:20 AM – 9:40 AM

3-16 Enough Of EMR Based VTE Risk Scores - We Need To Implement VTE Prophylaxis Based On These Alerts!

A. C. Ring, M. Beck, A. B. Reed, F. Aziz; Penn State University, Hershey, PA

BACKGROUND: Venous thromboembolism (VTE) is preventable and considered a major patient safety indicator. Individualized risk assessment models (RAMs) have been embedded into Electronic Medical Records (EMR) to increase appropriate utilization of pharmacologic +/- mechanical prophylaxis to decrease incidence of VTE. Effectiveness of such measures remains to be determined. The purpose of this study was to review the effectiveness of embedding a RAM into the EMR in increasing appropriate VTE prophylaxis across surgical and non-surgical services.
METHODS: Records were reviewed for all surgical and medical patients admitted from October 1, 2011 to October 31,2012. Charts were reviewed to determine the VTE risk assessment score upon admission, the proportion of patients who actually received adequate prophylaxis, and rate of hospital acquired VTE.
RESULTS: Medical records of 24,967 patient admissions were reviewed. Of these, 175(0.71%) developed VTE during their hospital stay. At the time of admission, 8824 (35.3%), 9348 (37.7%), and 4164(16.7%) were assigned to the low, moderate, high risk groups, respectively. The incidence of VTE among low, medium, and high-risk score patients was 0.18%, 0.94%, and 1.3%. Of the patients assigned to the high-risk group, 71.3% received both mechanical and pharmacologic prophylaxis. Among the patients assigned to the low risk group 94.1% received both mechanical and pharmacologic prophylaxis. However, 13.85% of those assigned moderate risk and 13.66% assigned high risk, did not receive any prophylaxis (Table I).

CONCLUSIONS: RAM for VTE is a reliable tool for predicting VTE episodes among hospitalized patients. Despite proper assignment to medium and high risk groups, physician adherence to appropriate alerts to initiate VTE prophylaxis is lacking. Improving physician awareness about the importance of these alerts may lead to better compliance with initiating VTE prophylaxis at the time of admission.

Proportion of Patients Receiving VTE Prophylaxis				
	Low Risk (n=8824)	Medium Risk (n=9348)	High Risk (n=4164)	Indeterminate Risk (n=2631)
Number of VTE (%)	16 (0.18%)	88 (0.94%)	54 (1.30%)	17 (0.65%)
Received Mechanical and Pharmacologic Prophylaxis	8302	6805	2967	1353
Received Mechanical and Pharmacologic Prophylaxis (%)	94.08%	72.80%	71.25%	51.42%
Received Mechanical Prophylaxis Alone	187	1169	542	560
Received Mechanical Prophylaxis Alone (%)	2.12%	12.50%	13.02%	21.28%
Received Pharmacologic Prophylaxis Alone	11	79	86	10
Received Pharmacologic Prophylaxis Alone (%)	0.12%	0.85%	2.07%	0.38%
No Prophylaxis	324	1295	569	708
No Prophylaxis (%)	3.67%	13.85%	13.66%	26.91%

9:40 AM – 9:45 AM

Q3-9 Role Of Coexisting Primary Chronic Venous Disease In Development Of Postthrombotic Syndrome Following Catheter-Based Treatment Of Iliofemoral DVT

J. J. Lee, M. Al-Jubouri, R. Acino, A. J. Comerota, F. Lurie; The Toledo Hospital-Jobst Vascular Institute, Toledo, OH

BACKGROUND: It has been reported that early clot removal benefits patients with iliofemoral DVT by removing obstruction and preserving valve function. However, a substantial number of patients who have been treated with clot removal techniques develop symptoms of postthrombotic syndrome (PTS). Residual thrombus and rethrombosis play a part in this phenomenon, but the role of coexisting primary chronic venous disease (PCVD) in these patients has not been studied.
METHODS: All patients who underwent catheter-based techniques of thrombus removal for symptomatic acute iliofemoral DVT over a 5-year period comprise the study group. These patients were assessed for PTS using the Villalta scale, Venous Clinical Severity Score (VCSS), and the VEINES quality-of-life (QOL) questionnaire. The presence of coexisting PCVD was determined by clinical and duplex ultrasound findings in the contralateral leg at the time of the initial DVT diagnosis. Patients who had coexisting PCVD were compared to those without PCVD.
RESULTS: 40 patients (40 limbs) were included in the study group. At initial diagnosis, 15 (37.5%) patients had coexisting symptomatic primary valve reflux in the unaffected limb. Following thrombolysis, 9/40 (22%) of limbs had complete lysis, 29 (73%) had ≥50-99% lysis, and 2 (5%) had <50% lysis. The mean percent of lysis in patients with or without PCVD was not statistically different (78% vs 86% p=0.13). Patients without PCVD had significantly better Villalta and VCSS scores compared to those with PCVD (Villalta 2.52 vs. 3.27, p=0.014; VCSS 2.96 vs. 3.29, p=0.005). 18/40 (45%) of patients developed PTS. Patients who developed PTS had significantly less percent clot lysis than those without PTS, regardless of the presence or absence of coexisting PCVD (60% vs. 85%, p=0.025 in patients with PCVD; 75% vs. 89%, p=0.013 in patients without PCVD). However, there was no significant difference in the VEINES QOL score between those with or without PCVD (79.5 vs. 80.5, p=0.9). Patients who had reflux in the treated limb post-lysis had a 5 x greater chance of developing PTS compared with those who retained normal valve function during follow-up (OR 5.3, 95% CI 1.6-17.045) However, in the absence of coexisting contralateral primary valve incompetence, the chance of developing PTS in patients who had reflux in the treated limb was reduced to almost 1.5 x compared with those who retained normal valve function in the treated limb. (OR 1.49, 95% CI 0.043-10.253).
CONCLUSIONS: Coexisting PCVD is a contributing factor to development of PTS after treatment of iliofemoral DVT with thrombus removal techniques.

9:45 AM – 9:50 AM

Q3-10 Tracking Breeds Success: Improved Retrieval Rates Of Inferior Vena Cava Filters With Minimal Dedication Of Resources

J. Kalish, M. Sloan, S. Sarosiek, H. Marks, C. Moreira, N. Hamburg, R. Vilvendhan, A. Farber; Boston Medical Center, Boston, MA

BACKGROUND: Although retrievable inferior vena cava (IVC) filters are utilized to prevent pulmonary embolism many of these filters are never removed and therefore become permanent. The challenge of retrieving IVC filters is especially prevalent in urban trauma and underserved populations which have poor compliance and follow-up. Based on traditionally low IVC filter retrieval, we developed a protocol to enhance the retrieval rate at our center and to assess its outcome.
METHODS: A retrospective review of IVC filter use at an academic tertiary referral center (and largest trauma center in New England) was performed between August 2003 and July 2012. In August 2012, a multi-disciplinary task force was created not only to track all future IVC filter placements, but also to contact former patients (with retrievable filters implanted between January 2011 and July 2012) in order to facilitate appropriate retrievals. Educational materials detailing risks and benefits of filters were mailed to eligible patients, and follow-up phone calls were made to discuss this material, answer patient questions, and schedule clinic appointments.
RESULTS: Of the 1,119 IVC filters placed during the studied time period (prior to August 2012), 774 were retrievable; however, only 83 (10.7%) were successfully retrieved. Unsuccessful retrieval attempts were made in 17 additional patients (17.0% of 100 total attempts). After creating the IVC filter taskforce in August 2012, retrieval procedures rose dramatically, as did patient education

and follow-up. Prospective retrieval occurred in 11 of 54 temporary filters (20.4%), 5 retrievals were unsuccessful (31.3% of the 16 total attempts), and concrete follow-up plans were formulated for the remaining 38 (70.4%) patients. Contact with former patients resulted in an improved retrieval rate of 39.8% (37/93) of eligible filters placed between January 2011 and July 2012 (19.6% unsuccessful retrieval rate). Education and communication efforts are still ongoing to improve these rates for this cohort of patients, while adhering to a reasonable time window for safe retrieval.
CONCLUSIONS: The use of IVC filters in urban trauma centers results in historically low retrieval rates, but efforts to track these patients and provide education and clinic follow-up yield significant advances in the potential for retrieval. This improved rate of retrieval is possible with minimal dedication of resources, and simple quality improvement initiatives can lead to a decrease in IVC filter-related complications in the future.

9:50 AM – 9:55 AM

Q3-11 Rheolytic Accelerated Pharmacomechanical Directional 'RAPID' Thrombectomy Technique: A Method For Rapid Clot Removal With Reduced Need For Catheter Directed Thrombolysis In Patients With Acute DVT

C. J. Grilli, M. McGarry, C. Wrigley, G. Kimbiris, D. Leung, M. Garcia; Christiana Care, Newark, DE

BACKGROUND: Inherent to mechanical thrombectomy devices is the lack of "complete" thrombus removal resulting in the need for CDT. Our goal is to evaluate the efficacy of the RAPID Thrombectomy technique for the treatment of acute DVT.
METHODS: A single center registry of 313 lower extremities in 301 patients treated for acute DVT between 1999 and 2012 was reviewed. Patients underwent pharmacomechanical thrombectomy (PMT) using the RAPID thrombectomy technique, which involves a 6F rheolytic thrombectomy catheter placed coaxially through a directional 8F guiding catheter used in a spiraling fashion allowing for wall-to-wall thrombectomy. Extent of clot removal and the need for adjunctive CDT, PTA and stenting were evaluated venographically. Follow-up with ultrasound (US) was performed.
RESULTS: 92 limbs demonstrated femoropopliteal DVT while 221 had iliofemoral DVT, with IVC involvement in 57. Thrombectomy by venography was complete (>90% removal + flow) in 203 (65%), substantial (50-90% removal + flow) in 75 (24%), partial (<50%) in 31 (10%), and minimal in 4 (1%) limbs following initial PMT. Flow was successfully restored in 90%. 166 (53%) patients underwent additional CDT with an average infusion time of 17.7 hours; 47% of cases were completed in one session. 86% were completed in < 24hrs. Stenting was performed in 106 (34%) limbs. Binary patency by ultrasound was 94%, 90% and 77% at 3, 6, and 12 months.
CONCLUSIONS: The RAPID thrombectomy technique is effective for rapid removal of thrombus in patients with acute DVT with significant reduction, in the need for, and length of, CDT.

9:55 AM – 10:00 AM

Q3-12 Placement Of Inferior Vena Cava Filters In A Real-World Setting Using The American Venous Forum Filter Registry

M. Mehta, R. Acino, A. J. Comerota, F. Lurie; The Toledo Hospital-Jobst Vascular Institute, Toledo, OH

BACKGROUND: The use of permanent and retrievable inferior vena cava (IVC) filters varies widely among institutions. Current literature on the subject is limited to large academic centers, single institutions, or specific populations such as Medicare. The purpose of this study is to analyze IVC filter placement in a real-world setting and to provide baseline data prior to implementing quality improvement programs.
METHODS: Medical records of patients receiving an IVC filter within a one-year period were entered into the American Venous Forum Filter Registry. Data were gathered from 6 community hospitals including a Level 1 trauma center. Practice variations related to physician specialty and hospital locations were analyzed, and factors potentially affecting retrieval rates of temporary filters were identified.
RESULTS: 244 filters were placed during the study period, with 82% placed by vascular surgeons, 17% by interventional radiologists, and 1% by cardiologists and general surgeons. 22% of filters were used prophylactically. The mean patient age was 65 years (range 14 to 98), and 49.5% were male. Retrievable filters comprised 49.6% of filters. Individual hospital placement of retrievable filters ranged from 0% to 87% with the highest use at the location of the trauma center. Only 13% of retrievable filters were removed, and time to retrieval ranged from 1 to 9 months. Reasons for non-retrieval included patient- and practice-related factors such as absence of organized follow-up, frequent transfer of care, and lack of patient education. There were 3 filter-related complications, all when retrievable filters were used. The mortality rate was 21% with one filter-related death.
CONCLUSIONS: Placement of IVC filters in the real-world setting remains suboptimal. Organizational factors play a substantial role in low retrieval rates and should be addressed by quality initiatives and institutional policies.

10:00 AM – 10:30 AM

Coffee Break ..... Crescent City Ballroom

10:30 AM – 12:00 PM

ACP SYMPOSIUM ..... Roosevelt Ballroom

The Evaluation and Treatment of Non-Truncal Varicose Veins of the Lower Extremities

Chair: Mark Forrestal, MD

Duplex Ultrasound Diagnostic Evaluation of Non-Truncal Varicose Veins of the Legs
Diana Neuhardt, RVT

Evaluation and Treatment Options for Pelvic Sources of Varicose Veins of the Lower Extremities
Carl Black, MD

Non-truncal Veins of the Lower Extremities - Therapeutic Modalities after Accurate Diagnosis Primary Therapy for Recurrent Varices
Marlin Schul, MD

Incompetent Perforators of the Lower Extremities - Physical Examination Findings, DUS Assessment and Treatment Options
Nick Morrison, MD

Lower Extremity Varicosities - Lateral Subdermic Plexus. Diagnosis and Treatment
Mark Forrestal, MD

Compression Therapy Options for Non-truncal Varicose Veins of the Lower Extremities
Lisa Pavone, MD

12:00 PM – 12:15 PM

Boxed Lunch ..... Roosevelt Promenade

12:15 PM – 1:15 PM

VILLAVICENCIO SYMPOSIUM ..... Roosevelt Ballroom

Acute Venous Thromboembolism: A Focus on Acute PE

Chair: Victor Tapson, MD

Objectives of Symposium:

1. Attendees will gain an appreciation for the general approach to the treatment of acute venous thromboembolism, and be able to state when and how new oral anticoagulants are effectively utilized, and when warfarin is appropriate.
2. Attendees will gain an understanding of when IVC filter placement is appropriate.
3. Attendees will be able to list and discuss several specific, more aggressive techniques/approaches to acute pulmonary embolism, including catheter-based thrombolytic therapy, systemic thrombolytics, and acute pulmonary embolectomy.
4. Attendees will be able to describe the types of patients that might be appropriate for a more aggressive approach to acute pulmonary embolism.

Treatment of Acute Venous Thromboembolism

The 2014 Villavicencio Symposium will focus on the approach to acute venous thromboembolism, with emphasis on acute pulmonary embolism (PE). The approach to acute PE has evolved over the past two decades with the increased use of low molecular weight heparins, and more recently, the availability of new oral anticoagulants. Large, multicenter, placebo-controlled, randomized trials have proven the efficacy and safety of these new oral agents in acute deep venous thrombosis as well as acute PE. Certain important parameters with regard to their use, however, are important for clinicians to understand. The use of vena caval filters has evolved, with increasing placement with the expectation of subsequent removal. Massive pulmonary embolism requires more aggressive measures, and the approach to submassive PE has been more controversial. Systemic thrombolytic therapy, catheter-based thrombolytics, as well as acute embolectomy and other novel therapeutic maneuvers have evolved and are being increasingly utilized for patients with more extensive emboli. Our symposium will offer the attendee a general understanding of the approach to these different clinical scenarios.

How to Optimize Medical Therapy for PE
Alex Spyropoulos, MD

Role of Catheter Directed Thrombolytic Therapy
Tod Englehardt, MD

Other Aggressive Therapies for Acute PE
Victor Tapson, MD

1:15 PM – 3:15 PM

SCIENTIFIC SESSION 4 ..... Roosevelt Ballroom

Chronic Venous Obstructions 2

Moderators: Rabih Chaer, MD, Apostolos Tassiopoulos, MD

1:15 PM – 1:35 PM

4-17 Identification And Treatment Of Restenosis In Failing Venous Stents: The Role Of Intravascular Ultrasound

P. E. Thorpe; Arizona Heart, Phoenix, AZ

BACKGROUND: Patients presenting with recurrent pain and edema, months-to-years after venous stenting, are commonly evaluated with duplex or venography. When findings are "normal" the physician is left with no explanation for recurrent venous hypertension. The purpose of this study is to show the value of looking inside the stent, with IVUS, to identify treatable hemodynamically significant lesions which cause symptomatic venous hypertension.
METHODS: Patients underwent standard measurements of limbs, duplex of lower extremities and iliac veins with attention to waveform analysis and velocities. Symptomatic patients were imaged from a jugular or popliteal approach with multi-plane venography and IVUS, to evaluate the stents and veins. In the event of in-stent stenosis, measurements of cross-sectional area were obtained before and after intervention. Treatment included angioplasty, atherectomy or strategic placement of a new stent. Procedures were performed on an out-patient basis. No change of therapeutic INR for patients on warfarin. A post-procedure duplex was performed and compared to the pre-op study.
RESULTS: Between 2002-2013, we evaluated 37 patients, (17M,20F) with 47 limbs, 17R, 30L (9 bilateral + 13 IVC) with previously placed iliocaval venous stents. Each person presented with new-onset pain and/or edema that had been absent after initial stenting. The onset of recurrent venous hypertension ranged between 6 months and 10 years. 27/47 limbs had occluded stents while 20/47 had one or more stenoses. Mean age 41.4 years (range 21-70 yrs). Lumen-compromising stenosis was identified within stents, with IVUS, in 90% of symptomatic patients, all of whom had "normal" findings on duplex. Tissue specimens were obtained in 3 cases, and evaluation showed fibrosis, not thrombus. Balloon dilatation effectively increased luminal area. Recalcitrant lesions (4) were successfully enlarged with balloon expandable nitinol stents. Sustained patency of the revisions has been excellent. Mean FU 38 months. All patients reported clinical improvement consistent with decreased venous pressure.
CONCLUSIONS: Patients with failing venous stents present with recurrent limb edema or pain, heaviness, tightness etc. Hyperplasia can narrow the diameter up to 30% and not be appreciated with standard duplex or venography. Restenosis typically occurs, circumferentially, where stents overlap and at the leading edges. IVUS is an important tool for investigating stent integrity in symptomatic patients. Timely endovenous evaluation and treatment of failing stents is clinically indicated to preserve patency.

1:35 PM – 1:55 PM

4-18 Human Chronic Postthrombotic Intraluminal Venous Obstruction Involves Neovascularization

C. Oostra[1], P. Henke[2], C. Luke[2], R. Acino[1], F. Lurie[1], A. J. Comerota[1]; [1]The Toledo Hospital-Jobst Vascular Institute, Toledo, OH, [2]University of Michigan, Ann Arbor, MI

BACKGROUND: Acute deep venous thrombosis (DVT) managed with anticoagulation undergoes evolutionary changes ranging from thrombus resolution to fibrotic obstruction. Our prior study characterized the intraluminal venous histopathology in the deep veins long after treatment for acute DVT, showing chronic fibrotic processes. Notable findings were recanalization and neovascularization channels, often occurring in close proximity, and no thrombus within the specimens. Even though recanalization and neovascularization are fundamentally different processes, a common stimulus might result in such close proximity. The purpose of this investigation was to examine these channels in postthrombotic specimens and correlate findings with specimen age.
METHODS: Specimens of chronic postthrombotic venous obstruction ranging in age from 7 months to 25 years were examined via immunohistochemical analysis to characterize specific tissue antigenicity. Early neovascularization was assessed by quantification of Angiopoetin-1 Receptor (TIE-2) and Vascular Endothelial Cell Growth Factor Receptor 2 (VEGF-R2) immunohistology. Later, or mature, neovascularization was quantified by Platelet Endothelial Cell Adhesion Molecule 1 (CD-31) and von Willebrand Factor (vWF) immunohistology. Specimen tissue was selected to represent young (< 12 months, N = 5) and old groups (> 10 years, N = 5). Quantification was done via counting of 10 random high power fields in a blinded fashion; comparison by T-test was performed.
RESULTS: Marker data were as follows: VEGF-R2 was greater in younger scar compared with older venous scar (6.7 ± 2.7 vs.1.7 ± 1.3 channels/hpf; P=0.016). Conversely, TIE-2 was greater in the older venous scar as compared with young (2 ± 1.1 vs.4.3 ± 3.0 channels/hpf; P=0.04). CD-31 showed no difference between young and old (9.8 ± 3.4 vs.7.0 ± 2.6 channels/hpf; P=0.19), while vWF was greater in the older venous scar (1.1 ± 0.7 vs. 7.1 ± 1.4 channels/hpf; P<0.001). Many positively stained VEGFR2 non-endothelial cells that cluster around the channels, consistent with endothelial progenitor cells, were more prevalent in the younger venous scar as compared with older (43.2 ± 9.6 vs.28.6 ± 2.8 cells/hpf ; P=0.01).
CONCLUSIONS: Evidence of neovascularization in postthrombotic femoral veins, consistent with fibrotic scar evolution, was observed, and suggests an active process with young and old differential endothelial markers present regardless of venous scar age. This is the first time this has been documented in humans and importantly correlates with experimental model VT resolution, suggesting that similar pathophysiological processes are occurring.

1:55 PM – 2:15 PM

4-19 Utility Of Iliac Vein Stenting In Elderly Population Over Age Eighty

S. Raju, M. Ward, Jr.; The Rane Center at St. Dominic, Jackson, MS

BACKGROUND: The geriatric population especially over the age of eighty with severe manifestations of chronic venous disease (CVD) face diminishing therapeutic options for relief. Self applied compression is often not possible because of fragility or arthritis. Significant limb swelling diminishes mobility impacting independent living, precipitating institutionalization. Limb ulceration and pain diminish quality of life at a time when it is a major factor in daily living. Cellulitis poses septicemic risk in this age group. Even when compression is possible, failure with recurrence likely occurs in >30 % as suggested in prevalence studies. Family caregivers are often able to continue homecare if the intensity of the level of care can be reduced. Iliac vein stenting appears to be safe and effective in this advanced stage of life.
METHODS: Patients who had failed or could not use compression were considered for iliac vein stenting. Routine diagnostic

work up and stenting technique previously described was used with some modifications. IVUS was the only initial diagnostic and intraprocedural method used if transfemoral venography could not be used because of extreme fragility, allergy or decreased renal function. General anesthesia was used for better cardio-pulmonary control during the procedure. Most patients were ASA class III or IV.
RESULTS: A total of 107 limbs in 95 patients (12 bilateral) were treated with iliac vein stents over a 15 year period. Median age was 83(80-96); 10 were >90 yrs age. Male:Female and Right:Left ratios were both 1:2. 59% were post-thrombotic, the remainder non-thrombotic. CEAP: C2 (with pain)=3%; C3=32%; C4=33%; C5=5% and C6=27%. Concurrent saphenous ablation was carried out in 28%. Thirty day mortality was 0. Primary and secondary patency at 5 years were 52% and 90% respectively. Grade of pain (VAS) improved from mean 4 ±2.97 to 1±2.15 after stenting (P<0.0001); Pain was completely relieved in 43% of limbs; Cumulative improvement in pain of at least 3/10 points (VAS) was 71% at 6 years. Swelling (Grade 0=none, 1= pitting, 2= ankle edema, 3= gross) improved from mean 2.3±1.01 to 1.3±1.27, (P<0.0001); swelling completely resolved in 25% limbs; cumulative improvement of at least 1 grade of swelling (examination) was 63% at 6 years. 67% (non-cumulative) of active ulcers healed. 37% of patients were able to discard stockings (P<0.001).
CONCLUSIONS: Iliac vein stenting appears to offer a safe and effective alternative in octogenarians and nonagenarians when compression fails, is difficult or impossible.

2:15 PM – 2:35 PM
4-20 Measurements Of Calf Muscle Oxygenation During Standing And Exercise In The Long-term Follow-up Of The First Episode Of Proximal Deep Vein Thrombosis
T. Yamaki, H. Konoeda, A. Osada, H. Sakurai; Tokyo Women's Medical University, Tokyo, Japan

BACKGROUND: Near-infrared spectroscopy (NIRS) provides continuous noninvasive monitoring of changes in tissue oxygenated hemoglobin (O2Hb) and deoxygenated hemoglobin (HHb) levels. The purpose of this study was to investigate changes in calf muscle O2Hb and HHb levels during standing and exercise in the follow-up of deep vein thrombosis (DVT), and to determine the indicative parameters reflecting the progression of post-thrombotic syndrome (PTS).
METHODS: Forty-three patients with a first episode of unilateral DVT were included. Final clinical manifestations were evaluated at the mean follow-up point of 53 months after the diagnosis of DVT, and PTS was considered present if the Villalta score was > 5. Moreover, to assess the severity of PTS, the revised Venous Clinical Severity Score (VCSS) was employed. NIRS was used to measure changes in the calf muscle O2Hb and HHb levels. On standing, increases in O2Hb, and HHb were calculated by subtracting the baseline value from the maximum value (ΔO2Hbst and ΔHHbst). The time elapsed until the maximum increases in O2Hb and HHb concentrations (TO2Hbst, and THHbst) were also measured. During ten tiptoe movements, the relative change in O2Hb was calculated by subtracting the value measured at the end of exercise from the value measured at the beginning of exercise (ΔO2Hbex). On the other hand, ten tiptoe movements produced venous expulsion (ΔHHbEex) and a subsequent retention (ΔHHbRex). The oxygenation index (HbD; HbD = O2Hb-HHb) was also calculated at the end of standing, and 10 tiptoe movements. (ΔHbDst and ΔHbDex).
RESULTS: Among the 43 limbs evaluated, 21 had PTS. On standing, the TO2Hbst was significantly reduced in patients with PTS in comparison with no PTS (43 ± 41, 107 ± 58 s, P=0.001). The ΔHbDst was significantly decreased in patients with PTS than in these without PTS (12 ± 8, 23 ± 11μmol/L, P=0.001). During 10 tiptoe movements, the ΔHHbEex was significantly reduced in patients with PTS in comparison with no PTS (-2 ± 1, -3 ± 1μmol/L, P=0.016). Similarly, the ΔHHbRex was significantly increased in PTS compared with no PTS (8 ± 7, 3 ±2 μmol/L, P=0.001). Furthermore, falls in ΔHbDex were more pronounced in PTS (-10 ± 16, 10 ± 10 μmol/L, P<0.001). NIRS-derived TO2Hbst (r=-0.568, P<0.001) and ΔHbDex (r=-0.645, P<0.001) showed strong inverse correlations with VCSS. Similarly, NIRS-derived ΔHHbEex (r=0.409, P=0.007) and ΔHHbRex (r=0.476, P=0.001) had moderate positive correlations, and ΔHbDst (r=-0.422, P=0.005) had a moderate inverse correlation with VCSS.
CONCLUSIONS: Changes in O2Hb and HHb concentrations differ between patients with and without PTS. The TO2Hbst, ΔHbDex, ΔHHbEex, ΔHHbRex, and ΔHbDst were considered as the important indicative parameters reflecting the progression of PTS.

2:35 PM – 2:55 PM
4-21 Thigh Compression Significantly Improves Venous Emptying After Deep Vein Thrombosis
C. R. Lattimer, G. Geroulakos, E. Kalodiki; Ealing Hospital & Imperial College, Middlesex, United Kingdom

BACKGROUND: It is well known that direct compression of the calf in patients with venous disease can reduce swelling and the venous volume. It is less clear whether intermittent compression of the thigh can achieve a same effect and which patients improve the most. The mechanism is unknown but may be a combination of reactive hyperemia and opening of the drainage pathways.
METHODS: This was a retrospective analysis on 332/519 air-plethysmography (APG) inflow/outflow curves in 192 patients between **1989** and **1995** at a tertiary referral hospitalospital. The median age was 51(17-89) years, 65% male and 52% left legs. Inclusion criteria were a history of DVT, a duplex examination and documentation of the site and type of deep venous disease. Reflux was defined as reverse flow >1 sec and obstruction as luminal narrowing or wall irregularity. Ascending phlebography was performed in 28% of patients. The clinical CEAP distribution (%) was: C0=5.4, C2=3.3, C3=68.4, C4=13, C5=3.6, C6=6.3. The APG tests were performed in a supine patient by inflating a thigh-cuff to 80 mmHg and recording the gradual increase in calf volume by a sensor calf-cuff using a pen trace on graphic paper (Fig 1). At the volume plateau the thigh-cuff was suddenly deflated to produce the outflow curve. Point A =thigh-cuff inflation, B =tracing speed increased, C =thigh-cuff deflation, D =tracing speed decreased, E =new baseline, F =inflow volume, G =outflow volume.
RESULTS: A single thigh compression and release manoeuvre caused a significant median reduction in calf volume by 9(5-15) mL, P<.000 (Wilcoxon). As shown in Table 1, the outflow volume was significantly greater than the inflow volume in all legs and also when legs were separated into categories based on their site and type of disease, P<.0005(Wilcoxon). The greatest effect was observed when pure refluxing legs were compared to those with pure obstruction. They had significantly greater inflow and outflow

volumes with a median reduction in calf volume of 13(8-18) mL *versus* 7(2-13) mL, P<.0005(Mann-Whitney).
CONCLUSIONS: Refluxing legs after a DVT have significantly greater venous volume changes than legs without reflux. Thigh compression can improve the venous emptying but the mechanisms require further investigation. This may provide the way for a new therapeutic device to reduce leg volume.

Figure 1: Volume versus time chart in a patient post DVT from the start of thigh-cuff inflation (A), deflation (C) and new baseline (E). The outflow volume (G) is clearly greater than the inflow volume (F).

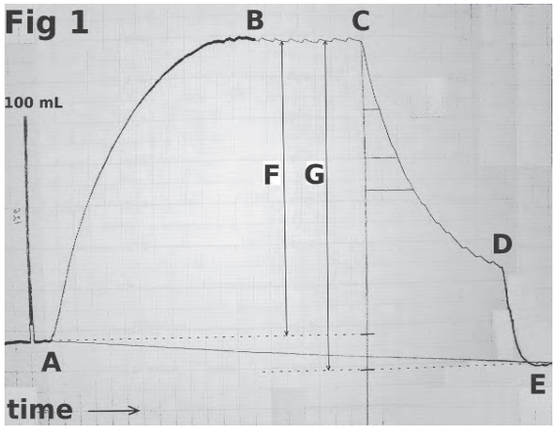


Table 1: Median (IQR) venous inflow and outflow following a thigh-cuff inflation and deflation				
	Legs	Inflow volume (mL)	Outflow volume (mL)	P value
Reflux only	65	111 (95-140)	123 (104-157)	<.0005
Obstruction only	140	77 (50-100)	84 (57-110)	<.0005
Iliac/femoral	188	89 (59-119)	98 (66-129)	<.0005
Popliteal/distal	144	88 (72-117)	98 (80-127)	<.0005
TOTAL	332	89 (66-177)	98 (75-128)	<.0005

2:55 PM – 3:15 PM

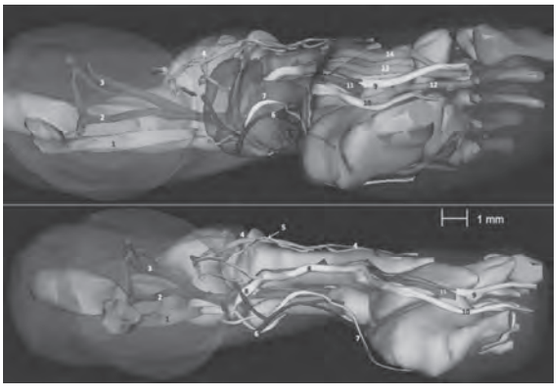
4-22 A New Tool To Study The 3D Venous Anatomy Of The Human Embryo, The Computer Assisted Anatomical Dissection

J. Uhl, C. Gillot; University Paris Descartes, Paris, France

BACKGROUND: The human organogenesis of the venous system of the lower limbs is not well understood to the best of our knowledge, no direct observation has been shown so far. The aim of this study is to provide realistic 3D models of the venous system of the lower limbs of human fetuses after the organogenesis.
METHODS: We used our technique of Computer Assisted Anatomical Dissection (CAAD). After embedding the two lower limbs of 3 embryos in paraffin, slices of 5 micrometer thickness were performed divided into blocks of 10. The first 4 slices of each block were studied by different staining and immuno markers as follows:
-Hematein-Eosin-Safran (HES): This was considered to be the reference section.
-The trichrome of Masson to identify the collagen fibers, colored in blue by Aniline.
-The protein S100 is a general immuno-labeling marker for the nerves.
-D2-40 was used as an immuno-marker of the vascular system in the fourth slice.
Digitalization of the stained slices were made with a 600 DPI scanner, providing 800 images. After alignment and numerotation of the slices, the 3D reconstruction technique was done by manual segmentation using the Winsurf software to obtain a vectorial model of the structures of interest: Skin, bones, muscles, nerves, arteries and veins.
RESULTS: In all fetuses, we found a big axial vein in each side, accompanying of the sciatic nerve, suggesting that it is the main vein of the thigh at the end of organogenesis. This vein becomes hypoplastic in the adult, reduced to a small arcade in 95% of the cases. (The 3D model of a 14 weeks fetus is shown on the figure below/)
CONCLUSIONS: The CAAD technique is unique in producing such a realistic 3D model of the vascular and nervous system. It confirms the theory of the “angioguiding nerves”. We observed the close relationship between the main veins and nerves, supporting the theory of the important role of the vascular endothelial growth factor (VEGF) secreted by the nerves. This stimulates the maturation of the vessels along the nervous pathway, and induces their specialization into arteries, veins or lymphatics.

Labels of the figure:

The nerves are colored in yellow, the arteries in red, veins in blue



1= Sciatic nerve
2= Axial vein
3= Femoral vessels
4= Great saphenous vein (light blue)
5= Saphenous nerve
6= Small sphenous vein (purple)
7= Sural nerve
8= Tibial nerve
9= Medial plantar nerve
10= Lateral plantar nerve
11= Tibial posterior vessels
Tendon & muscles
12= Posterior tibial muscle
13= Hallux flexor longus
14= Digitorum flexor longus

3:15 PM – 3:40 PM
Coffee Break ..... Crescent City Ballroom

3:40 PM – 4:20 PM
BEST PAPER SESSION..... Roosevelt Ballroom
Moderators: Andrew Nicolaides, MD, Nick Morrison, MD

3:40 PM – 3:50 PM
European Venous Forum – Best Paper 1
Long-Term (5-8 Years) Follow-Up After Ultrasound-Guided Foam Sclerotherapy For Varicose Veins: Patient-Reported Outcomes (Proms), Satisfaction, And Health-Related Quality Of Life
K.A.L. Darvall, G.R. Bate, A.W. Bradbury; University Department of Vascular Surgery, Birmingham, UK

OBJECTIVE: To determine the long-term clinical effectiveness of ultrasound-guided foam sclerotherapy (UGFS) for CEAP C2-6 varicose veins (VV) in terms of health-related quality of life (HRQL), patient satisfaction, and patient-reported outcomes (PROMS).

METHODS: Consecutive patients undergoing UGFS between April 2004 and May 2007 were invited for review a minimum of 5 years after treatment. Patients completed generic (Short Form, SF-12) and disease-specific (Aberdeen, AVSS) HRQL instruments, and questionnaires enquiring about lower-limb symptoms, lifestyle factors, and satisfaction with treatment. Data on re-treatments were prospectively recorded.

RESULTS: 378 limbs (276 patients) were reviewed (79% response rate) at a median (IQR) of 71 (67-78) months following first UGFS treatment. Disease-specific HRQL scores significantly improved at long-term follow-up, with 89% having improved AVSS compared with baseline. Symptom improvement and 'meeting of expectations' remained high at long-term follow-up: 63-94% of patients had their pre-treatment expectations, in terms of lower limb symptoms and lifestyle improvements, met or exceeded.

Regarding satisfaction, 82% were very satisfied with treatment and only 3% were dissatisfied; 91% would recommend the treatment to others.The overall re-treatment rate was 14.8% of limbs.

CONCLUSIONS: UGFS is highly effective in regard to PROMs, and the vast majority of patients remained very satisfied with treatment and would recommend it to others. Significant improvements in HRQL that have been seen early after UGFS are sustained to at least 5 years after treatment, and less than 15% of limbs required re-treatment for recurrence.

3:50 PM – 4:00 PM

European Venous Forum – Best Paper 2

Factors Associated With the Development of Superficial Vein Thrombosis in Patients With Varicose Veins

C. Karathanos[1], M. Exarchou[1], A. Tsezou[2], D. Kyriakou[3], C. Wittens[4,5], A. Giannoukas[1]; [1]Department of Vascular Surgery, Faculty of Medicine, School of Health Sciences, University of Thessalia, Larissa, Greece, [2]Department of Molecular Biology, Faculty of Medicine, School of Health Sciences, University of Thessalia, Larissa, Greece, [3]Department of Haematology, Faculty of Medicine, School of Health Sciences, University of Thessalia, Larissa, Greece, [4]Department of Vascular Surgery and Cardiovascular Research Institute Maastricht, Maastricht University Medical Centre, Maastricht, Limburg, The Netherlands, [5]Department of Vascular Surgery, University Hospital RWTH Aachen, Nordrhein-Westfalen, Germany

OBJECTIVES: Superficial vein thrombosis (SVT) is a common and controversial clinical entity. Recent studies have demonstrated that SVT should be seen as a venous thromboembolism (VTE). The objective of this study was to investigate the prevalence of thrombophilia defects and to estimate the role of age, sex and body mass index (BMI) in patients with varicose veins (VVs) and SVT.

METHODS: A total of 230 patients with VVs, 128 with, and 102 without SVT underwent thrombophilia testing included factor V Leiden, prothrombin G20210A, methylenetetrahydrofolate reductase and plasminogen activator inhibitor- 1 mutations, protein C, protein S (PS), anti-thrombin III and plasminogen deficiencies and levels of A2 antiplasmin, activate protein C resistance and lupus anticoagulant. According to Clinical- Etiology- Anatomy- Pathophysiology (CEAP) classification patients were categorized in two subgroups: moderate disease (C2,3) and severe disease (C4,5,6). Age and body mass index were also assessed.

RESULTS: The prevalence of thrombophilia defects was significantly higher in patients with moderate disease and SVT (p=0.002). In the C2,3 group, SVT was associated with PS deficiency (p= 0.018), obesity (p< 0.001), male gender (p= 0.047) and age (p< 0.001). There were no significant differences in patients with severe disease.

CONCLUSIONS: Age, male sex, obesity and PS deficiency are factors associated with SVT development among patients with VVs having moderate disease (C2,3).

4:00 PM – 4:10 PM

American College of Phlebology – Best Paper

Real Time Visualization of Lymphatic Dysfunction in Venous Ulcer Patients: the Effect of Pneumatic Compression, Results of a Pilot Study with IC Green

C. Fife[1], M. Aldrich[2], R. Guilliod[1], J. Rasmussen[1], E. Sevick[3], I. Tan[4]; [1]UTHSC Houston, Houston, TX, [2]The University of Texas Health Science Center, Houston, TX, [3]University of Texas Health Science Center, Houston, TX, [4]UTHSC Houston, Houston, United States

OBJECTIVES:

1. Visualize lymphatic function in real time
2. Relate visualization of lymphatic function to venous ulcer
3. Observe the effect of pneumatic pumping on the lymphatics of patients with venous stasis ulcers

METHOD: An investigational imaging technique using NIR fluorescence indocyanine green (ICG) which employs “night vision” technology to efficiently collect fluorescent light at 830 nm was conducted on 7 patients with VSU and CVI. After 8 intradermal injections of 25 micrograms to each leg baseline imaging was performed for up to 0.5 hr. PCD was then administered to one leg for one hour, and imaging resumed for 0.5 hr.

RESULTS: NIRF imaging was used to assess lymphatic structure and function evaluated before and after pneumatic compression. Some CVI patients were noted to have baseline lymphatic abnormalities similar to those in postmastectomy lymphedema such as dermal backflow, aberrant vessels, and lack of lymphatic “pumping.” In response to PCD treatment, five out of seven patients exhibited new lymphatic vessel recruitment to regions proximal to the wound. In some cases, lymphatic vessel pumping was remarkably enhanced following PCD.

CONCLUSIONS: This study is the first to demonstrate in real-time the lymphatic abnormalities present in CVI. Findings also demonstrate that PCD treatment can enhance lymphatic function among patients with CVI and VSUs. Further research is warranted to understand the effect of PCD on CVI.

4:10 PM – 4:20 PM

Royal Society Venous Forum – Best Paper

Control of Venous Valve Development and Maintenance

O. T. A. Lyons, S. Grover, A. Sabine, G. Vizcay-Barrena, E. Bazigou, T. Kum, N. A. Brown, T. Petrova, T. Makinen, A. S. Smith; King’s College London, London, United Kingdom

OBJECTIVES: Venous valves are essential to maintain unidirectional blood flow but the molecular regulators of their development and then maintenance are poorly understood. Lymphoedema and venous reflux are known to be associated in patients carrying rare gene mutations, which may provide insight into gene function. Recently, we have compared the molecular expression profile of murine and human venous valves. We have characterised normal venous valve formation in mice and used knockout lines to show that genes required for regulating lymphatic valve development are required for venous valve development and then also maintenance in the adult. These and other recent developments will be presented and the genetic patterning of venous valves with respect to the genetics of human venous disease will be discussed.

METHODS: Murine valves were examined by widefield, confocal and scanning electron microscopy in genetic reporter lines and wildtype mice at time points from E18 to adult. Human valves were examined by immunohistochemistry, scanning electron microscopy and transmission electron microscopy. Conditional murine tissue-specific knockout lines were used to identify roles of genes in valve formation and maintenance.

RESULTS: Novel genes were identified as being required for venous valve formation and maintenance.

CONCLUSIONS: Venous and lymphatic valves share a common gene-expression profile and some developmental pathways, which explains the shared phenotype of lymphoedema and venous reflux seen in the clinic. Further work should be aimed at defining other genetic and environmental factors required for the development and maintenance of these complex structures in normal valves and in a pathological setting.

4:20 PM – 5:10 PM

D. EUGENE STRANDNESS MEMORIAL LECTURE ..... Roosevelt Ballroom

Insights into Mechanisms That Regulate the Resolution of Venous Thrombi

Keynote Speaker: Alberto Smith, PhD

Alberto Smith is a Professor of Vascular Science and Head of the Academic Department of Surgery at King's College London. His research centers around the regulation of tissue remodeling in vascular diseases, in particular venous disease. The emphasis of his research is on the elucidating mechanisms that regulate thrombus resolution and the development and maintenance of venous valves. This work is carried out using both models of disease and studies in man, and is facilitated by biochemical, histological, genetic and novel imaging techniques. He is a founding member of the European Vascular Biology Organization and is the Non-Clinical Member of the Vascular Society of Great Britain & Ireland Research Committee.

5:15 PM – 7:00 PM

POSTER PRESENTATIONS..... Roosevelt Ballroom

Moderators: Joseph Raffetto, MD, Marc Passman, MD

P1 Decreased Pro-inflammatory M1 Macrophage Response May Impair VT Resolution

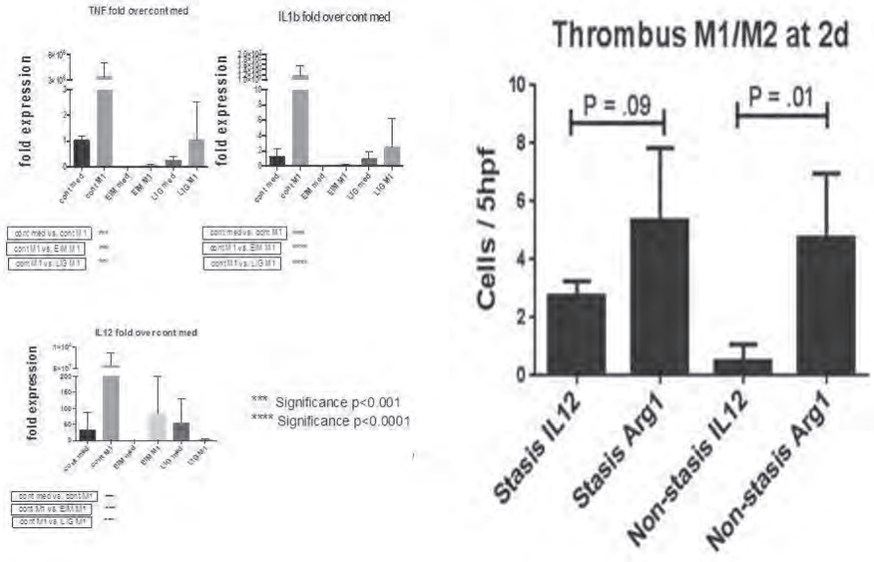
K. Gallagher, A. Obi, E. Hogikyan, D. Coleman, P. Henke; University of Michigan, Ann Arbor, MI

INTRODUCTION: Macrophages are the primary leukocyte involved in VT resolution, by clearance of cellular debris such as necrotic PMNs, as well as having pro-fibrinolytic activity. Within the thrombus, cellular necrosis is an inflammatory process that may promote ongoing thrombogenesis. Clearance of necrosis allows resolution of inflammation and is likely mediated by macropahges; however, the specific dependence of VT resolution on the macrophages has not been examined. We hypothesized that bone marrow derived macrophages would display a decrease in M1, pro-inflammatory macrophage activity early in VT in both the stasis and non-stasis models.

METHODS: We used established murine models of VT to mimic the clinical spectrum of DVT, with segments of stasis and non-stasis (LIG and EIM). Bone marrow was harvested from 10 C57/Bl6 mice (N=3 LIG, N=3 EIM, N=4 control) and cultured for 7 days using standard conditions to isolate macrophages. Macrophages were skewed towards M1 using lipopolysaccharide (LPS) and interferon-gamma and cells harvested at 6 hours. RNA analysis was done with standard primers for key M1 cytokine genes (TNF, IL-1B, IL-12). Histology sections were obtained at 2 days and stained for either IL12 (M1) or Arginase (M2) cells.

RESULTS: IL-12, TNF and IL1B mRNA in BM macrophages skewed towards M1 is significantly decreased in both the EIM and LIG models early in thrombosis (2 days) compared to controls. Hisological analysis of thrombus from EIM and LIG models demonstrated increased M2 marker, Arginine, at 2 days post VT. Figure 1.

CONCLUSIONS: Macrophages exhibit an M2 predominant phenotype early in VT in both the EIM and LIG models and may result in impaired thrombus resolution. Whether manipulation of macrophage phenotypes towards an M1 predominate phenotype early in VT could reduce inflammation and improve thrombus resolution requires further work.



P2 Sequential Compression Device Compliance In Post-surgical Patients: A Randomized Controlled Trial

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BACKGROUND: Sequential compression devices (SCD) in conjunction with chemical thromboprophylaxis have been shown to reduce deep venous thrombosis (DVT) in post-surgical patients. However, SCDs suffer from shortcomings such as size, weight, and requirement for attachment to external power source, leading to poor compliance. This study was undertaken to determine whether the use of a battery-powered, mobile SCD would improve compliance in general and orthopedic surgery post-operative patients.

METHODS: General surgery and orthopedic surgery patients (n=67) admitted to the general care ward in a large academic hospital with expected length of stay >24 hours were randomized to regular SCDs or battery-powered SCDs. Hourly compliance was documented for 24 consecutive hours by trained physician observers. Nurses and patients participating in the study were issued a questionnaire with multiple likert items to assess barriers to SCD compliance and device satisfaction. Differences in SCD compliance and questionnaire responses were evaluated using Fisher's exact test.

RESULTS: Compliance with standard SCDs over a 24 hour period was 47%, compared to 85% with the battery-powered SCD device (p<0.001). The most common barriers to compliance identified by nurses and patients were need for ambulation and transfers (see table), both of which were significantly diminished with use of the battery-powered device. Only 14% of patients issued a standard device reported no major problems, compared to 79% of those issued a battery-powered device (p<0.005). A significantly greater proportion of nurses (72% v. 35%, p=0.01) were more likely to apply SCDs when patient was out of bed (in chair).

CONCLUSIONS: Compliance with standard SCDs on a general surgical ward is <50%, which can be improved significantly with the use of mobile, battery-powered devices. Major barriers to SCD compliance included need for ambulation and transfers, which was mitigated with the use of a mobile device. This data suggests that it is possible for patients to meet dual VTE prevention strategies of early mobilization and SCD utilization, using the right equipment. Further studies are needed to determine to what extent SCD compliance correlates with prevention of DVT events.

Most common barriers to SCD compliance identified by patients			
	Standard SCD (n=21)	Battery SCD (n=24)	P value
I had to walk	15 (71.4)	7 (29.2)	0.007
I had to transfer to chair, commode or bathroom	15 (71.4)	9 (37.5)	0.023
I had no problem wearing my SCDs	3 (14.3)	19 (79.2)	<0.005

Most common barriers to SCD compliance identified by nurses

	Standar SCD (n=40)	Battery SCD (n=18)	P value
Patient ambulating	39 (97.5)	10 (55.6)	<0.005
Patient transferring to chair, commode, or bathroom	37 (92.5)	10 (55.6)	<0.005
Patient refusal	37 (92.5)	8 (44.4)	<0.005

P3 The Role Of Venous Augmentation In Iliac Venous Stenting For Chronic Occlusion

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BACKGROUND: Iliac venous stenting is the standard treatment for chronic iliac venous occlusion. Post-thrombotic limbs carry a higher risk of recurrent obstruction for which 'augmentation procedures' including common femoral endovenectomy, patch venoplasty and arteriovenous fistula (AVF) creation have been advocated. This study presents a single center experience with chronic iliac venous recanalization and selective utilization of 'augmentation procedures' in an effort to identify risk factors for treatment failures and optimize patient selection.
METHODS: A retrospective review was performed. Primary outcomes included stent patency, complications and symptom improvement. Quality of life information was obtained with the SF-36v2 health survey. Multi-variable regression was performed to confirm clinically suspected risk factors for failure and a survival analysis with Cox-proportional hazard models was performed to generate risk-adjusted patency curves.
RESULTS: 108 limbs of 82 patients with post-thrombotic (N=73) and non-thrombotic (N=9) occlusive disease underwent iliac venous stenting between 2010 and 2013. Mean patient age was 47 years (range 19-89); there was a male predominance (57%). 67% of limbs were treated for C3 disease; 8.5% were treated for advanced disease (C5/C6). Twelve patients underwent elective augmentation following iliac stenting for extensive common femoral, femoral and profunda thrombus by venogram or duplex. During a median follow-up of 11 months (range 0-40) primary patency was 89%; assisted patency was 93%. In total 21 limbs required re-intervention including thrombolysis (N=9), endovenectomy (N=4), AVF creation (N=5), angioplasty for in-stent stenosis (N=10), and stent extension (N=10). 70% of stents requiring re-intervention remained patent at last follow-up. Younger age, post-thrombotic disease and need for re-intervention were independent risk factors for stent failure. Patients that underwent planned AVF creation for difficult anatomy (N=11) all maintained stent patency at last follow-up. Four of the five patients (80%) that required thrombolysis and augmentation with AVF creation for early stent occlusion demonstrated recurrent occlusion at last follow-up. Sixteen AVF were created in total with the following outcomes: spontaneous occlusion (N=7), elective embolization (N=7) and ongoing patency (N=2). Morbidity was 8% and there were no patient deaths or limb loss. Complications included infectious (N=2), hemorrhagic (N=4), and iliac venous rupture intra-operatively that required wall stent (N=1). Symptoms improved in 79% of patients and no patient complained of symptom progression at last follow-up.
CONCLUSIONS: Therapies for post-thrombotic iliac venous occlusion remain imperfect mandating a selective approach to patient selection. Inflow is critical to ensuring stent patency; this may require surgical augmentation. Specific criteria for predicting adequate inflow into the stented iliac segments require definition. Aggressive surveillance is crucial to ensure assisted-patency given that 70% of patients requiring re-intervention demonstrated ongoing stent patency.

P4 The Value Of Hemodynamic Measurements By Air Plethysmography In Diagnosing Chronic Venous Obstruction Of The Lower Limb

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BACKGROUND: Air plethysmography (APG) is a noninvasive test that can measure changes in venous volume. Several hemodynamic parameters indicative for venous reflux and venous outflow can be obtained. The use of APG has been validated in chronic venous insufficiency, though its use in diagnosing outflow impairments remains debatable.
The aim of this study is to assess the quality of APG as a diagnostic test in identifying and quantifying chronic venous obstruction.
METHODS: All patients who reported at our tertiary, specialized venous outpatient clinic for evaluation of chronic venous complaints and received an APG during the period of November 2011 until July 2013 were prospectively analysed. APG results were compared with duplex ultrasonography (DUS). To analyze the usefulness of APG in detecting obstruction we took the outflow fraction (OF) as our main parameter. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated for this parameter with obstructions on different levels of the venous system according to the LET classification.
RESULTS: A total of 278 legs in 225 patients were assessed by APG, male/female ratio was 91/134 (40%/60%). Mean age was 46 years.

In the table below the figures for diagnosing severe post thrombotic obstruction are given. Sensitivity is 21.3%, specificity is 74.8%, PPV is 32.7% and NPV is 62.4%.

Diagnosing severe post thrombotic obstruction			
	Severe obstruction (DUS: >50% obstruction)	No severe obstruction (DUS: <50% obstruction)	
Severe obstruction APG (OF<28%)	98	59	157
No severe obstruction APG (OF≥28%)	33	16	49
	131	75	206

In the following table figures for diagnosing iliac vein compression without post thrombotic changes are given. Sensitivity is 13.0%, specificity is 72.5%, PPV is 10.7% and NPV is 76.7%.

Diagnosing iliac vein compression without post thrombotic changes			
	Iliac vein compression on DUS	No iliac vein compression on DUS	
Severe obstruction APG (OF<28%)	66	20	86
No severe obstruction APG (OF≥28%)	25	3	28
	91	23	114

Subanalysis of diagnostic values for different LET classes in the post thrombotic group showed no consistent differences, except for a higher NPV. When combining LET II and III; NPV was 82.5%.
CONCLUSIONS: Obstruction causing outflow impairment should be identified by the outflow fraction. Though, sensitivity, specificity, PPV and NPV are too low for diagnostic use of APG in chronic venous obstructive disease.

P5 Iliocaval Confluence Stenting For Chronic Venous Occlusions
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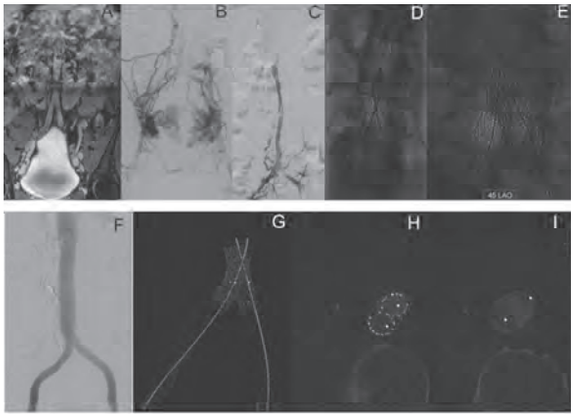
BACKGROUND: Different techniques have been described to perform stenting of chronic iliocaval obstructions. However, individual techniques were limited by available stents and stent design. We report on our experience with a new technique using dedicated venous stents to treat extensive iliocaval obstructions.
METHODS: From 2009 till 2013 we treated 20 patients for chronic total iliocaval occlusions. Pre-operative Magnetic Resonance Imaging showed bilateral extensive post-thrombotic scarring in common and external iliac veins as well as obstruction of the inferior vena cava (IVC), in some cases extending above the level of the renal veins. Stenting of the caval vein was performed with Sinus XL (Optimed) stents up to the level of the iliocaval confluence. Then, bilateral stenting was performed using Sinus XL (Optimed™), Zilver Vena (Cook™) or Sinus Venous (Optimed™) stents. Bridging the common iliac vein confluence was performed with dedicated balloon expandable stents (Andramed™).
RESULTS: Recanalization was achieved in 100% of the cases. A mean number of 5.2±1.7 stents were used in the caval vein and iliac veins. In 4 (20%) cases a hybrid procedure with endophlebectomy and arteriovenous fistula creation was needed because of common femoral vein involvement. Mean follow-up was 475 days (range 22-1310 days). Primary and secondary patency rate at 12 months was 79% and 95% respectively.
CONCLUSIONS: With the combination of dedicated venous stents and optimal stenting strategy, endovenous treatment of bilateral chronic iliocaval obstruction is feasible and effective, with excellent short-term patency rates.



P6 Pharmacokinetics And Electrocardiac Effects Of Polidocanol Endovenous Microfoam (PEM) In Humans
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BACKGROUND: Data concerning the pharmacokinetics (PK) of polidocanol endovenous microfoam (PEM) have not previously been reported. An open label study investigated PK parameters and electrocardiac (ECG) effects following treatment with PEM 1.0% or PEM 2.0%.
METHODS: Patients with saphenofemoral junction (SFJ) incompetence due to reflux of the great saphenous vein (GSV) or other major accessory vein were randomly assigned by gender to receive a 10-mL dose of PEM 1.0% or PEM 2.0% (2 x 5-mL injections 10 minutes apart). The primary objective was to measure plasma concentrations of 4 major polidocanol oligomers (E5, E9, E12, and E14) in order to derive the following PK parameters for total polidocanol and the 4 oligomers: maximum concentration (Cmax), time to Cmax (Tmax), area under the curve (AUC), elimination rate constant (Kel), terminal elimination half-life (T1/2), clearance (CL), and volume of distribution (Vd). Blood, urine, and triplicate ECGs were collected immediately before and at multiple timepoints up to and including 8 hours following PEM treatment. Patients were monitored for adverse events (AEs).
RESULTS: Twenty-one (21) patients were treated with PEM 1.0% (3 male and 6 female) and PEM 2.0% (6 male and 6 female). Polidocanol first peaked within 4-5 minutes after the first injection and reached Cmax within 15 minutes of the first injection (4-5 minutes following the second PEM injection). Overall polidocanol exposure was higher in female than in male patients. However, weight-normalized data demonstrated no consistent differences in mean Cmax or AUC values between sexes. The rise in plasma polidocanol concentrations was less than proportional to increasing PEM dose concentration. Mean Vd and CL were similar in male and female patients. Mean T1/2 ranged from 102 to 153 minutes across treatment groups. Less than 0.02% of dose was recovered in urine. CL, Vd, Cmax, and AUC of oligomers E9, E12, and E14 were approximately 2-fold greater and 2-fold less, respectively, than those of oligomer E5. Both PEM doses were well-tolerated, with less than 50% of patients reporting an adverse event (AE). Most AEs were mild and resolved without sequelae. A review of ECG data revealed there was no significant effect of PEM on cardiac repolarization.
CONCLUSION: PEM 1% and 2% demonstrated consistent and reproducible pharmacokinetics. Differences between male and female patients were attributed to differences in body weight. There was no QT elongation or other demonstrable ECG changes. Both PEM doses were generally well tolerated.

P7 The Impact Of Depression And Anxiety On The Perception Of Success And Satisfaction Following Varicose Vein Interventions In The UK

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BACKGROUND: Patient reported outcome measures (PROMs) have been collected on all patients undergoing varicose vein treatments in the UK National Health Service (NHS) since 2009. The aim of this study was to examine PROMs for varicose vein interventions, and the impact of depression and anxiety on patient reported perception of success and satisfaction.
METHODS: Centrally-compiled PROMs data for varicose vein procedures carried out within the NHS from 2009-2011 was obtained from the Hospital Episode Statistics data warehouse for England. Statistical analysis was performed using SPSS (version 21).
RESULTS: Data for 35,093 patient episodes (63% female) were available for analysis. 776 per 10,000 reported a diagnosis of depression. Quality of life, as measured by generic EQ-5D index and a varicose vein-specific score, improved post-intervention as compared with pre-intervention (related samples Wilcoxon signed rank test, $p<0.001$). There was no significant improvement in EQ-5D visual analogue scores (related samples Wilcoxon signed rank test, $p=0.082$). There is a significant improvement in self-perceived level of anxiety or depression with intervention (McNemar-Bowker test, $p<0.001$). There is a statistically significant relationship between pre-operative depression or anxiety, and self-reported post-intervention success and satisfaction (Chi-squared, $p<0.001$). There is also a statistically significant relationship between post-operative anxiety or depression, and self-reported success and satisfaction (Chi-squared, $p<0.001$).
CONCLUSIONS: This analysis reinforces the evidence that varicose vein interventions improve quality of life, and anxiety or depression. Pre- and post-operative anxiety or depression levels significantly impact on patient-perceived levels of success and satisfaction.

P8 Intermittent Pneumatic Compression Alone Versus Combined Intermittent Pneumatic Compression And Graduated Compression Stockings In Improving Venous Flow Of Lower Limbs

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BACKGROUND: Intermittent Pneumatic Compression (IPC) and Graduated Compression Stockings (GCS) have gained widespread acceptance as prophylactic measures against deep vein thrombosis (DVT) due to their abilities in increasing venous flow and preventing venous stasis. There are few studies comparing IPC alone with combination of IPC and GCS in preventing DVT. It is still unclear in international guidelines if IPC should be used alone or in combination with GCS.
OBJECTIVES: This study was designed to evaluate the hemodynamic effect of IPC as compared to combined IPC and GCS in enhancing venous outflow of lower limbs among healthy adults.
METHODS: Twenty (20) healthy adult volunteers were recruited. Peak systolic velocity (PSV) and total volume flow (TVF) measurement of common femoral vein blood flow were obtained using duplex scan at rest in supine position. This was repeated with the application of IPC then GCS and eventually the simultaneous use of both devices in supine position, with adequate rest period in between.
RESULTS: The application of IPC significantly augmented the PSV, 80% and TVF, 90% relative to resting PSV, 23.73cm/sec and TVF, 312.90ml/min respectively whereas the use of GCS alone did not alter the venous flow from baseline. Though the simultaneous use of IPC and GCS increased the venous return of lower limb, it did not produce further augmentation of PSV or TVF as compared to the use of IPC alone.
CONCLUSION: IPC increases venous flow of the lower limb with or without addition of GCS. Further clinical trials need to be undertaken to compare IPC alone with combined IPC and GCS in reduction of DVT.

P9 Performance And Safety Evaluation Of The Trellis-8 Thrombectomy System In The Management Of Consecutive Patients With Occluded Inferior Vena Cava Filters

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BACKGROUND: Percutaneous, minimally invasive devices and interventions have been relatively recently described in the management of venous thromboembolism. Among them, The TrellisTM-8 thrombectomy system is a pharmacomechanical thrombolysis catheter that enables interventionists to treat a blood clot focally within a targeted venous segment. To our knowledge, this is the first report series evaluating the performance of the TrellisTM-8 system in the treatment of symptomatic, inferior vena cava (IVC) filter-related thrombotic occlusion.
METHODS: A retrospective review of consecutive patients affected by thrombotic occlusion of the IVC, associated to the presence of an IVC filter over a 44-month study period, was performed. Between January 1st, 2009 and August 31st, 2013, ten of such patients were identified. Among them, six patients undergoing percutaneous venous thrombectomy for symptomatic IVC occlusion after filter placement, by using the TrellisTM-8 thrombectomy system were seen. Two TrellisTM-8 catheters were advanced into the occluded IVC, positioning the distal occlusive balloons past the occluded IVC filter, in a "kissing balloon style". Demographics, clinical data, procedures and outcomes were extracted. Patients were followed for the development of thromboembolic complications to the last clinic visit or to the time of death.
RESULTS: Overall, 57.1% were male, mean age was 58.6 years (range 46-78 years) and 66.7% were Caucasians. All patients complained upon presentation of lower extremity edema and pain. All had occlusion below the IVC filter, with the suprarenal cava being unaffected by the thrombotic process. The mean time between IVC filter placement and the development of occlusion related symptoms was 435.2 days (range 14-1094 days). A technical success of 100% was seen. During a mean follow-up period was 271.8 days (range 4-1083 days), all patients experienced relief of symptoms and no thromboembolic complications developed in this treated cohort.
CONCLUSIONS: In this performance and safety evaluation, the TrellisTM-8 thrombectomy system was found to be safe and effective in decreasing thrombus burden in the presence of an occluded IVC filter. Further prospective, long-term evaluation of IVC patency after pharmacomechanical thrombectomy for filter-related IVC occlusion is warranted. This study series represent the first report in the English literature of the use of the TrellisTM-8 system to treat thrombo-occlusion of IVC filter in consecutive patients.

P10 Appropriate Use Of D-dimer Testing Can Minimize Over Utilization Of Venous Duplex Ultrasound In A Contemporary High Volume Hospital

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BACKGROUND: Sensitivity of D-dimer (DD) in detecting deep venous thrombosis (DVT) is remarkably high, however many institutions will send patients immediately to venous duplex ultrasound (VDU). This study was designed to examine the appropriate utilization of DD and VDU in a high volume tertiary care center.
METHODS: A retrospective study was conducted for consecutive patients who presented with lower extremity limb swelling to a high volume emergency department (ED) over a 30-day period of time. Data for patients sent for VDU during DVT evaluation were included and merged with electronic DD lab results. Enzyme-linked immunosorbent assay (ELISA) method was used to provide DD values and thresholds. Values above of 0.60 mg/SEU were considered abnormal.
RESULTS: We reviewed 517 medical records of ED patients for June 2013. Sixty-six (12.8%) VDUs were excluded for history of DVT, PE or surveillance, leaving 451 for analysis. Average age was 59.7+16.5 years with more females 256 (56.8%), and the majority reported limb pain or swelling (74.9%). DD was performed on 64 patients with an average value of 4.1+6.2 mg/SEU of which 54 (84.4%) were positive. For positive DD patients, 9 (16.7%) were positive for DVT by VDU. DD identified all positive and negative DVT patients (100% sensitivity and positive predictive value), but also included 45 false positives (18.2% specificity). On the other hand, 387 patients were sent directly to VDU without DD. Of those 61 (15.8%) were positive for DVT by VDU. However, 326 (84.2%) patients were DVT negative by VDU without DD, these were deemed improper by our current protocol. Potential charge savings was calculated as VDU for all (326 x $1000 = $326,000) - (DD for all (326 x $145=$47,270) + VDU for false positives (274 x $1000=$274,000)) = $4,730 with yearly charge savings as $56,760 and unnecessary VDUs could be avoided. In addition, a receiver operator curve (ROC) analysis revealed that a higher threshold value could be established without adding any false negatives, which could result in even greater savings.
CONCLUSIONS: Based on the results from our study, we suggest that the D-dimer test should be utilized during the initial work-up for patients with limb swelling in ER. Appropriate utilization of DD as well as other clinical criteria may limit the over utilization along with all of the added related cost of VDU without having a negative impact on patient care. The results of D-dimer should be utilized to limit the number of patients sent for VDU to only those patients with positive DD or other significant underlying concerns.

P11 Current Strategies For The Management Of Inferior Vena Cava Filter Thrombotic Occlusion

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BACKGROUND: Inferior vena cava (IVC) occlusion is a rare, potentially life-threatening complication related to placement of IVC filters. We present our experience with filter-induced IVC occlusion in order to assess the feasibility, safety and effectiveness of its endovascular management.
METHODS: After IRB approval was obtained, a retrospective review of 11 consecutive cases of symptomatic IVC occlusion after filter placement in a 44-month time frame was performed. Demographics, clinical data, method of management and outcomes were extracted. Patients were followed to the last clinic visit or to the time of death.
RESULTS: Overall, 71.4% were male and the mean age was 53.6 years (range 50-78 years). Four different types of IVC filters were associated with thrombotic occlusion: OptEaseTM (6), Greenfield (1), Meridien (3) and Gunther TulipTM (1). The mean time between IVC filter placement and filter occlusion was 396.1 days (range 14-1094 days). All patients were clinically symptomatic at the time of their presentation, with lower extremity edema and discomfort in various degrees of severity being present in all of them. All patients but two were successfully managed endovascularly. In the two exception patients, their symptoms were mild and not disabling and therefore, the treating physicians chose observation and anticoagulation alone as the mode of therapy. The Trellis-8™ thrombectomy system was the most common endovascular strategy, which was performed in six patients. In this subgroup of patients, bilateral popliteal venous access as established and two Trellis-8™ devices were advanced in parallel into the occluded IVC, positioning the distal occlusive balloons past the IVC filter, in a “kissing balloon style” configuration. Two patients had balloon angioplasty with stent placement for chronically occluded IVCs. No thromboembolic complications developed during a mean follow-up period of 392.7 days (range 4-1083 days).
CONCLUSIONS: Endovascular management with pharmacomechanical thrombolysis of IVC occlusion is feasible, safe and effective in decreasing thrombus burden in the presence of IVC filter, for most cases with severe, disabling symptoms. Further studies evaluating long-term IVC patency after endovascular management of filter-related IVC occlusion are warranted.

Figure. Upper left image shows an occluded IVC filter in a patient with severe leg swelling and discomfort. The middle figure shows complete clot clearance by application of the Trellis-8 system in a kissing configuration. The upper right image shows the filter being retrieved and the lower left image shows completion venogram after filter removal. The removed filter is shown in the lower right image.

P12 A Prospective Observational Study Comparing 810nm And 1470nm Wavelength For Great Saphenous Endovenous Laser Ablation

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BACKGROUND: Endovenous laser ablation (EVLA) in the treatment of superficial venous insufficiency (SVI) is supported by level 1 evidence, however the efficacy of various laser wavelengths is debated. This study aims to compare clinical and technical outcomes of the 810nm and 1470 nm wavelength diode lasers during EVLA
METHODS: 2 sequential groups of patients undergoing EVLA for primary sapheno-femoral junction (SFJ) incompetence and Great Saphenous Vein (GSV) reflux were studied.
The 810nm laser was used from May 2010 - August 2011 and the 1470nm laser was used from September 2011 - August 2013. All patients were treated with NeverTouch® fibres and underwent concomitant phlebectomies.
Assessments were performed at baseline and at 1, 6 and 12 weeks after treatment.
Primary outcome measurements: interoperative pain, recorded on a 100mm visual analogue scale (VAS)
Secondary outcome measures:
- daily pain over the subsequent week (VAS)
- time to return to normal activities & work
- technical success assessed by duplex ultrasound (DUS) to determine abolition of SFJ and GSV reflux
- disease specific quality of life (QoL) (Aberdeen Varicose Vein Questionnaire)
- generic quality of life (SF-36, EQ5D)

RESULTS: 47 received NT-810, 38 received NT-1470. Baseline characteristics were well matched between the groups.
There was no significant difference in median (IQR) interoperative pain between the 1470 group (1.40mm, 0.30-2.70mm) and the 810 group (2.10mm, 1.20-5.00mm), P=0.083.
Daily VAS pain scores on days 2, 3, 4 and 5 were not significantly different between the 2 groups. However the 1470 group demonstrated significantly less pain on day 6 (p=0.030) and day 7 (p=0.02).
1470 patients returned to normal activities more quickly than 810 patients - 2 (1-2.75) days vs 7 (3-20) days, p<0.01, and returned to work more quickly - 2 (1-4) days vs 10 (5-14) days, p<0.01.
There were no significant difference in technical success rates at 12 weeks (1470 = 94.7% and 810 = 100%, p=0.190.
There was no significant intergroup difference at 12 weeks in AVVQ (p=0.869), EQ5D (P=0.119), or SF-36 (Physical Function P=0.824, Role Physical P=0.679, Bodily Pain P=0.112, General Health P=0.533, Vitality P=0.546, Role Emotional P=0.950, Mental Health P=0.341)
CONCLUSIONS: the 1470nm should replace the 810nm laser in routine clinical practice given the associated shorter duration of post-operative pain and earlier return to normal activities.

P13 The Potential Of Skin Capillaroscopy For The Early Detection Of Chronic Venous Insufficiency (CVI)

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BACKGROUND: Early detection of CVI may help in the prevention of leg ulcers in patients with Chronic Venous Disorders (CVD) through a better targeting of the high risk ones. As the venous microangiopathy is a central pathophysiological event in the development of the cutaneous complications of CVI, we investigated the potential of capillaroscopy in this respect.
METHODS: Skin capillaroscopy pictures (magnification X50, CapXview®) were systematically taken at the level of the medial and lateral malleoli of both legs in a series of patients following a spa treatment course for CVI (CEAP “C” class 3 or more in at least one leg). Those pictures were subsequently blindly analyzed, with digital measurement of the capillary density, and the diameters of the capillary loops and the dermal papillae. Rank correlations of these parameters with the CEAP “C” classes, and ROC curves for the diagnosis of CVI (C3-C6) were calculated with the SPSS Software.
RESULTS: Twenty-one patients participated: 11 women and 10 men, mean age 70.6+/-6.9 years. The CEAP “C” classes of the 42 examined legs were C0-C2: n=17; C3: n=10; C4: n=9 and C5: n=6. The analysis of capillaroscopy parameters showed a reduction in capillary density (p<0.05), an increase in capillary diameter (p<0.01) and an increase in papillary diameter (p=0.001) with increasing CEAP “C” classes. For all three parameters, changes were more pronounced at the medial malleolus. In this series, a papillary diameter of 65µm or more showed a likelihood ratio of 2.8 for the diagnosis of CVI.
CONCLUSION: These results confirm the importance and early occurrence of the venous cutaneous microangiopathy in CVI patients and its predominance on the medial aspect of the leg. They show that the simple and non invasive capillaroscopy technique allows an easy documentation of this microangiopathy and are consistent with a potential interest of capillaroscopy in the practical early detection of CVI, but this hypothesis requires further studies.

P14 Passive Joint Movement Of The Lower Limb Has Equivalent Efficacy When Compared To Intermittent Pneumatic Compression In The Prevention Of Venous Stasis

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BACKGROUND: Venous stasis is an element of the Virchow’s triad and is widely recognised as the prime factor of venous thromboembolism (VTE) particularly in the perioperative periods. Reducing or abolishing lower limb venous stasis would potentially reduce the incidence of perioperative VTE. Current mechanical devices like graduated compressive stocking (GCS), intermittent pneumatic compression device (IPC) and foot impulse technology (FIT) are still suboptimal in the prevention of VTE. This could be due to the lack of efficacy of these devices to promote physiological and near-complete emptying of the venous plexus in the lower limb. We have invented a prototypical mechanical device, ‘Cycloflo’, which causes passive joint movement of the lower limbs

mimicking 'walking', to increase venous flow in a more physiological way and to compare it with IPC.
METHODS: Twenty healthy individuals aged 18 years and above were recruited for the comparison study of the device with IPC. Their baseline venous PSV and TVF of the common femoral vein were measured. 'Cycloflo' device was applied to their lower limbs for five minutes. The venous PSV and TVF of the right common femoral vein were measured during and immediately after application of 'Cycloflo'. The flow measurements were repeated with the application of IPC in the same manner as 'Cycloflo' device.
RESULTS: Baseline resting peak systolic velocity (PSV) and total volume flow (TVF) were 23.98cm/s and 306.20ml/min respectively. With the application of 'Cycloflo' device, the PSV and TVF were increased about two-fold during the exercise and there was increased residual flow after the exercise. As for IPC, the PSV and TVF were increased similarly as the 'Cycloflo' during its application but the parameters returned to baseline value after cessation of IPC.
CONCLUSION: Using the prototypical 'Cycloflo' device to induce passive joint movement of the lower limbs, the venous flow was increased during and remained increase after the exercise. Passive movement does prevent venous stasis and is as efficient as IPC. It has the potential to be used in combination with IPC or other mechanical devices to further enhance the efficiency of venous emptying. Further clinical trials are needed to determine the efficacy of passive lower limb joint movement in venous thromboembolism (VTE) incidence reduction.

P15 Evaluation Of Haemodynamic Properties Of Neuromuscular Stimulation, Using Ultrasound And Laser Doppler
K. Williams, A. H. Davies; Imperial College London, London, United Kingdom

BACKGROUND: Enhancement of peripheral circulation has demonstrated benefit in many vascular disorders. This study compares the haemodynamic efficacy of a novel neuromuscular electrical stimulation (NMES) device with intermittent pneumatic compression (IPC) in healthy subjects.
METHODS: 10 healthy volunteers were randomised into two groups. Baseline measurements of superficial femoral arterial and venous velocity and flow were taken. Subjects received bilateral therapy with both devices in turn - SCD Express (Kendall) and geko-T1 (Firstkind UK), the order reversed between groups. Laser doppler fluximetry readings were taken from hand and foot. Baseline readings were compared with readings after immediate cessation, and after 10 minutes.
RESULTS: RESULTS –6 males and 4 females, mean age 27.1, BMI 24.8 completed the study. IPC caused 51% ($p=0.002$), 5% (ns) and 3% (ns) median changes in venous peak velocity, TAMV and flow rate respectively; NMES stimulation caused a 103%, 101% and 101% median changes in the same parameters (all $p=0.002$). The benefit was lost upon deactivation. IPC did not improve arterial haemodynamics. NMES caused 11%, 84% and 75% increase in arterial parameters ($p<0.01$). Laser doppler readings taken from the leg were increased by NMES ($P<0.001$), dropping after deactivation. For IPC, the readings decreased during use but increased after cessation. Hand flux signal dropped during activation of both devices, rising after cessation.

CONCLUSIONS: The NMES device enhances venous flow and peak velocity in the legs of healthy subjects, warranting further clinical evaluation. Its use in the prevention of venous thromboembolic events has not been explored. It enhances arterial TAMV and flow rate, which may prove to be of clinical use in the management of peripheral arterial disease.

P16 Hemodynamic Coupling Of A Pair Of Venous Valves
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BACKGROUND: Anatomy of the lower extremity veins shows that the native venous valves are not uniformly distributed in the venous system. Recent in vivo study of the valve spacing and show that the mean spacing between valves of the GSV and femoral vein (FV) is 3.8 ~ 4.6 cm and the mean angle of orientation is 84 ~ 88°. It is hypothesized that this configuration can regulate the flow around the valves. The aim of this study is to characterize the flow interaction of paired valves and investigate the hemodynamic advantage of this valve pairing configuration.
METHODS: A bench top in vitro experiment was setup to simulate the flow inside a venous valve at physiological venous conditions. Two bicuspid bioprosthetic valves paired in angles 0 and 90° were put into a 12mm diameter glass vessel model and The spacing between the two valves was 3 to 5 cm. Particle Image Velocimetry (PIV) was applied to measure the streamwise and spanwise velocity fields between and after the valves.
RESULTS: The jet flow at the second valve exit from the orthogonal valve pairing configurations turns to the outer region of the vessel. In between the valves significantly less stagnation region from 90° valve pairing over 0° valve pairing case is found. The coupling effect of the valves extends beyond 4 times of the vessel diameter, albeit the ability to alter the flow decreases at larger distances.
CONCLUSIONS: The 90° valve pairing configuration provides better regulating ability than 0° ones, and the separation distance affects the hemodynamic efficiency of the two valves by reducing the total reverse flow volume.

P17 Viability Of Endothelium Under Short-term Storage Of Vein Segments In Oxygenated Perfluorocarbon Emulsion Perftoran And In Other Conservation Media
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BACKGROUND: Thrombosis is the most serious complication during the early post-surgical period after transposing valve-containing venous segments. The aim of this study is to compare the viability indicators of endothelium in short-term conservation of vein segments in vitro: in perfluorocarbon-based O2 carrier Perftoran (OJSC SPC Perftoran, Moscow, Russia), physiological solution and venous and arterial blood of the patient.
METHODS: We examined 5cm long fragments of the great saphenous vein, which had been excised intraoperatively in 58 patients suffering from the ischemic heart disease. The examined vein section was divided into 5 fragments with a length of 1cm each. On

one of them we immediately performed brush biopsy of the intima followed by preparation of a membranous endothelium specimen. The remaining 4 vein fragments were placed in 4 test tubes filled with the test media. 0.9% NaCl solution, heparinized auto-arterial and auto-venous blood and Perftoran were used as preservatives in equal volumes, 10 ml each. During the 15th and 30th minute of conservation we performed biopsies on them.
Afterwards we determined the quantitative share of those endotheliocytes that showed signs of necrobiosis in 5 visual fields of each membranous specimen. We used a light binocular microscope at a magnification of 10x25. In the cytologic analysis we examined the following signs of endothelium degradation and necrosis: karyolysis, karyorrhexis, karyopyknosis, karyolemma rupture, cytolemma disintegration, swelling of the nuclei with formation of an optical cavity, pronounced cell metachromasia.
We used the data analysis platform KNIME (Konstanz Information Miner), KNIME Desktop, version 2.6.2. for our calculations and the Shapiro-Wilks test to check normal distribution for all groups. The Wilcoxon test was applied for comparative analysis.
RESULTS: On the reference membranous specimens, the median (Me) of endotheliocytes showing signs of necrosis was 10%, the interquartile range (IQR) being 8% - 13%. In the Perftoran sample, the least share of cells with irreversible endothelium changes was in the 15th minute of conservation, Me - 18%, IQR - 16% - 20%. In the 30th minute of conservation, we found a considerable share of necrosis in all specimens, the least one being in the Perftoran sample - Me 29%, IQR - 26%-32%. The biggest shares were found in the auto-venous blood and in the physiological solution.
CONCLUSIONS: 1. The crucial factor for preservation of vein graft endothelium is time. Conservation for more than 15 minutes is undesirable as it causes big increases in endothelium necrosis indicators in all test media.
2. For short-term storage (less than 15 minutes) of a vein segment, Perftoran is superior to other conservation media.

P18 IVC Filters For Prevention Of Venous Thromboembolism In Obese Patients Undergoing Bariatric Surgery: A Systematic Review
H. M. Moore, S. P. Rowland, B. Dharmarajah, A. H. Davies; Imperial College London, London, United Kingdom

BACKGROUND: The incidence of VTE in modern bariatric procedures with traditional methods of thromboprophylaxis, such as sequential calf compression devices and perioperative low molecular weight heparin, is approximately 2%. The use of Inferior Vena Cava (IVC) filters for prevention of Venous Thromboembolism (VTE) in bariatric surgery is a contentious issue. We aim to review the evidence for the use of IVC filters in bariatric surgical patients, describe trends in practice and discuss challenges in developing evidence-based guidelines.
METHODS: A systematic review of the literature was conducted according to PRISMA guidelines. We searched Medline up until July 2013 with the terms 'bariatric filter' and 'gastric bypass filter'. Two investigators independently screened search results according to an agreed list of eligibility criteria.
RESULTS: 18 studies were included. There were no randomised controlled trials and observational data was highly heterogenous. Controlled cohort studies suggest that those who undergo IVC filter insertion may be at higher risk of developing DVT (Range 0.93-3.13% vs 0.40-2.35%) and PE (0-0.80% vs 0.12-28%) but could benefit from improved PE-related mortality (0-0.37% vs 0-11%). Twelve case series reporting VTE outcomes from 497 patients demonstrated DVT rates of 0-20·8% and PE rates ranging from 0-6·4%. IVC filter-specific complications including insertion site DVT and device migration occurred in 0-11·1% of patients. There was 72-100% filter retrieval with technical failure in 0-9.3%.
CONCLUSIONS: Published data reporting the safety and efficacy of IVC filter use in bariatric surgical patients is highly heterogeneous. There is no evidence to suggest that the potential benefits of IVC filters outweigh the significant risks of therapy. Where IVC filters are used early retrieval may increase technical success and reduce long-term complications.

P19 Venous Duplex Ultrasound Is Over-Used For Lower Extremity Pain And Swelling
K. H. Nagarsheth, K. Singh, J. Schor, B. George, P. Suen, J. Deitch; Staten Island University Hospital, Staten Island, NY

BACKGROUND: Lower extremity venous duplex ultrasound (LEVDU) is over-utilized to exclude deep vein thrombosis (DVT) in patients with leg pain and swelling. These findings alone are not enough to warrant DVT screening with lower extremity venous duplex ultrasound (LEVDU). We performed this study to evaluate the utility of LEVDU in identifying DVT in patients presenting with lower extremity pain and swelling.
METHODS: We performed a retrospective review and chart analysis for all LEVDU performed at our institution from May 2013 until July 2013. We identified studies that were performed for an indication of lower extremity swelling, pitting edema or extremity pain (ICD-9: 729.81, 782.3 and 729.5, respectively). A comprehensive chart review was performed for each patient looking at variables including; gender, race, smoking history, history of prior DVT, newly diagnosed cancer, BMI, limb swelling, presence of pitting edema and localized extremity pain. Multivariate analysis was conducted using SPSS 20. Nonparametric data was analyzed using Chi square test and parametric data was compared using independent sample t-test. The level of significance was set to an alpha of 0.05.
RESULTS: A total of 1,442 LEVDU were performed during this time period of these only 119 (8.3%) were positive for lower extremity DVT. There were 807 LEVDU ordered for ICD-9 codes 729.81, 782.3 and 729.5 (232, 275 and 300, respectively). Ninety-one of these patients (11.2%) were positive for DVT.
Patients positive for DVT were more likely to have a history of prior DVT ($p<0.001$), recently diagnosed cancer ($p<0.001$) and paralysis ($p<0.001$) compared to those who were negative.
The negative group had a significantly higher incidence of whole limb swelling ($p<0.001$), pitting edema ($p<0.001$) and localized pain ($p<0.001$) compared to the positive group. This group was also significantly older ($p<0.001$) and had a higher BMI ($p<0.001$) than the DVT group.
CONCLUSIONS: Based on this analysis, physical exam findings of lower extremity swelling, pain and pitting edema may not necessarily be indicative of DVT, and a thorough differential diagnosis should be explored before ordering a LEVDU. This may help to reduce hospital cost and labor.

P20 **Left Iliac Vein Compression As A Cause For Pelvic Congestion Syndrome**

M. A. F. de Wolf[1], C. W. K. P. Arnoldussen[2], R. Kurstjens[1], S. Penninx[1], R. de Graaf[1], C. H. A. Wittens[1]; [1]Maastricht University Medical Center, Maastricht, Netherlands, [2]VieCuri Medical Center, Venlo, Netherlands

BACKGROUND: Pelvic congestion syndrome (PCS) can be characterized by varicose enlargement and insufficiency of intra-abdominal veins, especially the internal iliac vein and its tributaries and the ovarian veins. Patient complaints vary, however chronic abdominal pain is almost uniformly present and can be debilitating in its severity. Venous collateralization and reversal of flow in the internal iliac vein and its tributaries has been noted in iliac vein obstructive disease, especially in left iliac vein compression syndrome (May-Thurner syndrome). Obstruction at the level of the common iliac vein can thereby induce hemodynamics typical for pelvic congestion syndrome. In this study we describe our experience in diagnosing and treating patients with a combination of PCS and left iliac vein compression syndrome.

METHODS: From a prospective database of patients treated for deep venous occlusive disease, we selected all patients with clinical signs of PCS and radiologic confirmed left iliac vein compression syndrome. 10 patients were identified. All had received extensive duplex ultrasound examination and magnetic resonance venography (MRV), 8 patients received phlebography followed by PTA and stenting of the left iliac tract. Moreover, one patient received simultaneous left ovarian vein embolisation, and two had already received embolisation in an earlier session.

RESULTS: All 10 patients were female with an average age of 38.5 ± 9.1 years. Patients reported an average visual analog pain scale of 5.1 ± 3.1. Left iliac vein compression was seen on duplex in 80% of cases, and in 100% of cases on MRV and phlebography. All patients showed venous collateralization on multiple levels on MRV and phlebography. Average diameter of the left and right ovarian vein was 7.0 ± 1.7mm and 6.2 ± 2.0 mm, respectively. 8 patients received PTA and stenting of the left common iliac vein. All stents were patent at last follow-up; average follow-up 180 ± 126 days. 6 patients improved significantly in clinical symptoms, 1 improved partly and 1 patient did not note any improvement.

CONCLUSIONS: Left iliac vein compression can be associated with clinical and radiological signs of pelvic congestion syndrome. We hypothesize reversal of flow in the pelvic veins and/or the development of pelvic collaterals to be the cause of these symptoms. PTA and stenting of the left common iliac vein can be performed in these pelvic congestion patients with excellent patency rates and very favorable clinical success rates.

7:00 PM – 7:30 PM

Poster Reception ..... Waldorf Astoria Ballroom

7:30 PM – 9:00 PM

BTG International, Inc. Industry Symposium ..... Blue Room

(This Symposium is not part of the official program of the AVF 26th Annual Meeting)

7:00 AM – 8:00 AM
Continental Breakfast ..... Crescent City Ballroom

7:00 AM – 8:00 AM
UIP SYMPOSIUM..... Roosevelt Ballroom
Guidelines and Consensus of UIP
Chair: Nick Morrison, MD & Angelo Scuderi, MD

Introduction
Nick Morrison, MD

The Summary of the Last UIP's Consensus
Armando Schapira, MD & Eduardo Tkach, MD

Guidelines on Diagnosis of Lymphedema
Attilio Cavezzi, MD & Pier Luigi Antignani, MD

Venous Hemodynamics
Marianne De Maeseneer, MD & Mark Meissner, MD

UIP Consensus on Foam Sclerotherapy
Malay Patel, MD & Philip Coleridge-Smith, DM FRCS

Guidelines on Diagnosis of Vascular Malformations
Kurosh Parsi, MD

Conclusion
Angelo Scuderi, MD

8:00 AM – 9:30 AM
SCIENTIFIC SESSION 5..... Roosevelt Ballroom
Superficial Vein Disease 2
Moderators: Harold Welch, MD, Paul Pittaluga, MD

8:00 AM – 8:20 AM
5-23 Defining Great Saphenous Vein Closure Rates for Ultrasound Guided Foam Sclerotherapy
J. Ulloa, Jr.[1], H. Hiller[2]; [1]Fundacion Santa Fe de Bogota, Bogota, Colombia, [2]Clinica del Rosario, Medellin, Colombia

BACKGROUND: No publication to date has defined primary, primary assisted and secondary closure rates for this procedure.
METHODS: We defined primary closure as no recanalization after 1 year follow up of the great saphenous vein, primary assisted as the need for a second intervention at 6 weeks and secondary closure as the need for a further intervention after 6 months follow up. Data was collected prospectively in a 2 year period from March 2010 until September 2012. We included patients with primary great saphenous vein insufficiency. We used Cox proportional hazard analysis and Kaplan Meyer survival tables to measure factors influencing recanalization rates.
RESULTS: We collected 960 patients (86.6% female, median age 61.5) who underwent primary treatment of the great saphenous vein using ultrasound guided foam sclerotherapy as a sole treatment. Overall primary occlusion rate was 63.3%, primary assisted occlusion rate 86.6% and the cumulative 1 year occlusion rate was 96.7%. Cox proportional hazard analysis showed that saphenous vein diameter and the use of oral anticoagulant (hazards ratio 2.98, p<0.0001, CI 95% 1.97-2.44 and hazards ratio 5.19, p<0.0001, CI 95% 3.47-7.76 respectively) were the most significant factor influencing recanalization rates.
CONCLUSIONS: Ultrasound guided foam sclerotherapy as a sole treatment method for great saphenous insufficiency is feasible and effective, but requires close follow up and frequent but feasible re- interventions

8:20 AM – 8:40 AM
5-24 The Durability Of Polidocanol Endovenous Microfoam Treatment Effect On Varicose Vein Symptoms And Appearance In Patients With Saphenofemoral Junction Incompetence: One-year Results From The Vanish-2 Study
K. L. Todd, III[1], D. Wright[2], E. Orfe[3]; [1]Southeast Vein and Laser Center, Dothan, AL, [2]BTG International, Ltd., London, United Kingdom, [3]BTG International Ltd., West Conshohoken, PA

BACKGROUND: Polidocanol endovenous microfoam (PEM) is a low density sterile injectable microfoam being studied for the comprehensive treatment of symptoms and appearance of varicose veins caused by saphenofemoral junction (SFJ) incompetence. Here we describe the one-year results from VANISH-2, a randomized, blinded multicenter trial evaluating the durability of treatment with PEM on improvement of varicose vein symptoms and appearance in patients with SFJ, trunk vein incompetence, and visible varicosities.
METHODS: Two hundred twenty-one patients were evaluated at 1 year, representing 96% of patients who completed the primary endpoint measured at Week 8 following treatment. The objective of this 1-year study was to evaluate the durability of effect as measured by VVSymQ™ (assessment of symptoms as reported by the patient using an electronic daily diary); IPR-V^3, and PA-V^3 (assessment of appearance by an Independent Physician Review panel and by patient self-assessment, respectively); and response to treatment (as assessed by duplex ultrasound). After Week 8, patients had the option of receiving up to 2 treatments with open-label PEM 1% in the treated leg. Safety information on venous thrombus AEs and SAEs were collected.
RESULTS: Table 1 shows mean VVSymQ™ scores for the placebo, 0.5%, and 1.0% PEM dose groups at baseline, Week 8, and 1 year. Patients in all dose groups showed continued improvement in symptoms and appearance at 1 year compared to Week

8. Additionally, placebo patients who received PEM 1% during the open-label phase also achieved a significant improvement in symptoms at 1 year. Duplex response was also maintained at 1 year. In patients who previously had a venous thrombus adverse event (VTAE), none had a recurrence of thrombus or evidence of post-thrombotic syndrome at 1 year.
CONCLUSIONS: At 1 year, the VANISH-2 study demonstrated a continued improvement in varicose vein symptoms and appearance. This study provides evidence that the effects of treatment with PEM are sustained at 1-year by assessment by all measures: VVSymQ™, PA-V[3], IPR-V[3], and duplex ultrasound.
Table 1: Mean VVSymQ™ Daily Diary Scores at Baseline, Week 8, and 1 Year*

	Baseline	Week 8	1 Year
Blinded PEM without OL PEM 1% (n=64)	8.8	3.1	2.1
PEM 1% (n=31)	7.5	3.2	1.7
PEM 0.5% (n=20)	10.4	2.3	1.9
Study Treatment plus OL PEM 1%†			
PEM 0.5% or 1% (n=58)	8.7	3.4	2.0
Placebo (n=44)	9.0	6.7	2.9

*On the VVSymQ™ instrument, lower scores and/or negative change scores indicate better outcomes; †After the Visit 5 (Week 8) assessment, patients had the option of being treated with open-label PEM 1%.

8:40 AM – 9:00 AM
5-25 Results Of The Tahoe I And II Studies: Use Of A Novel Biodegradeable Implant To Treat Refluxing Great Saphenous Veins
J. Almeida MD[1], I. Franklin[2]; [1]Miami Vein Center, Miami, FL, [2]The Cadogan Clinic, London, United Kingdom

BACKGROUND: Interest is growing for endovenous closure of saphenous vein incompetence without the use of heat or tumescent anesthesia. Two studies were conducted to evaluate the feasibility of a novel biodegradable implant, polyglycolic acid (PGA), to occlude incompetent great saphenous veins (GSV) without tumescent anesthesia.
METHODS: TAHOE I and TAHOE II were prospective, single-arm studies using the same PGA implant. Slight modifications were made to the TAHOE II protocol (e.g. removed mandate for heparin use and post-procedure compression). TAHOE I was conducted at 3 sites in Europe and enrolled 51 patients; TAHOE II was conducted at 1 site in the Dominican Republic and enrolled 30 patients. After treatment patients returned at 1 day, 1, 2 and 6 weeks and 3 and 6 months. Vein occlusion, reflux, post procedure pain (0-10), quality-of-life (CIVIQ2), venous clinical severity score (VCSS), and adverse events were assessed at each visit.
RESULTS: Occlusion and reflux-free rates are summarized in Table 1. Initial occlusion and reflux-free rates were >90% in both studies.
Table 1: Simple Proportions of limbs fully occluded and reflux-free to 6 months

	1 day		6 weeks		3 months		6 months	
	TAHOE I	TAHOE II	TAHOE I	TAHOE II	TAHOE I	TAHOE II	TAHOE I	TAHOE II
Occlusion	96.1%	100%	82.0%	96.4%	79.6%	64.0%	84.0%	66.7%
Reflux-free	96.1%	100%	90.0%	100.0%	87.8%	64.0%	90.0%	66.7%

Change in CIVIQ2 scores and VCSS scores to 6 months are summarized in Table 2. CIVIQ2 scores were elevated at 1 day but showed improvement at 6 weeks that was sustained through 6 months. VCSS improved after day 1 and through to 6 months.
Table 2: Change from baseline CIVIQ2 scores and VCSS scores to 6months

	1 day		6 weeks		6 months	
	TAHOE I	TAHOE II	TAHOE I	TAHOE II	TAHOE I	TAHOE II
CIVIQ2 Change from Baseline, mean(SD)	5.7(15.5)	9.3(13.3)	-13.8(13.4)	-10.0(11.1)	-13.4(13.2)	-9.2(11.2)
VCSS, mean (SD)	5.7(1.7)	4.9(3.0)	2.1(1.9)	3.2(3.6)	1.2(1.2)	2.4(2.6)

Pain (median (IQR)) at day 1 was 2.0 (0,3) in the TAHOE I study and 2.5 (0,5) in the TAHOE II study but decreased to 0 (0,0) from 2 weeks - 6 months for both groups. The most commonly reported adverse events were induration (20% TAHOE I, 41.4% TAHOE II), erythema (12% TAHOE I, 48.3% TAHOE II), fever (34.5% TAHOE II), nausea (34.5% TAHOE II) and phlebitis (8% TAHOE I); all resolved by 6 wks. No patient experienced neuropraxia.
CONCLUSIONS: Tumescent-free PGA implantation resulted in high initial GSV occlusion with recanalization appearing in some patients at 3 months post-procedure. PGA is promising, but requires modification to achieve higher long-term occlusion and reflux-free rates.

9:00 AM – 9:20 AM
5-26 Mid-term Results Of A Randomised Controlled Trial Comparing Endovenous Laser Ablation And Surgery For The Treatment Of Small Saphenous Insufficiency
S. Nandhra, J. El-Sheikha, N. Samuel, T. Wallace, D. Carradice, I. Chetter; Hull-York Medical School, Hull, United Kingdom

BACKGROUND: Early results of a randomised control trial (RCT) comparing endovenous laser ablation (EVLA) with surgery for the treatment of small saphenous vein (SSV) insufficiency demonstrated a rapid recovery with lower peri-procedural pain and fewer sensory complications in those patients treated with EVLA. Two year RCT follow-up aims to affirm whether EVLA is as effective as surgery for the management of SSV insufficiency in the medium-term.
METHODS: Patients with primary sapheno-popliteal junction (SPJ) incompetence and/or SSV reflux were randomised to either EVLA or Surgery (SPJ ligation and stripping/excision of the SSV). Follow-up at 1, 6, 12, 52 and 104 weeks assessed clinical

recurrence, post-procedural complications and disease specific quality of life (QoL) (Aberdeen Varicose Veins Questionnaire, AVVQ).
RESULTS: 106 patients were equally randomised and 88-patients (83%) were assessed at two years with equal losses (n=9) to follow-up in each group. At 2-years the surgery group consisted of 32women and 12men with a median (IQR) age of 48years (37-57) and the EVLA group consisted of 20women and 24men with a median age of 45 (39-55) years.
Recurrence
There was no significant difference in clinical recurrence (surgery =10/44(23%) and EVLA = 7/44 (16%), p=0.74) or SSV incompetence on Duplex (surgery 7/44 (16%) and EVLA 2/44 (5%), P=0.157) between the 2 groups.
Complications
The early significant difference in sensory disturbance, became non-significant at 2 years (surgery =3/44 and EVLA = 1/44,P =1.000).
QoL
No significant difference in median (IQR) AVVQ-scores (surgery 2.75 (0-7.25) and EVLA 3.53 (0-9.22), p=0.412) were apparent between the two groups at 2 years.
CONCLUSIONS: Two-year follow-up demonstrates that EVLA for SSV insufficiency offers highly efficacious mid-term benefits equivalent to surgery and given its early post-operative superiority, should be considered first-line treatment.

9:20 AM – 9:25 AM
Q5-13 Readability And Availability Of Online Treatment Options For Varicose Vein Patients
K. D. Menezes, D. G. Nair; Sarasota Memorial Hospital, Sarasota, FL

BACKGROUND: Patients are becoming increasingly reliant on the Internet as a source of medical information. This content is often presented in a manner that is not readily understood. The aim of this study was to assess the availability and readability of treatment options for varicose vein patients on the Internet.
METHODS: A survey was distributed to 100 office patients over one month to determine which search terms were queried regarding varicose veins. The Google search engine was employed to seek the top 50 results for three different key word searches: “varicose veins,” “vein center,” and “vein laser.” Web sites for each term were categorized and analyzed for ownership, breadth of non-surgical treatment options described, and readability. The Flesch Kincaid Grade Level and Gunning Fog Index were calculated to assess readability.
RESULTS: Web site ownership varied based on the search term used: “varicose veins” generated 19 physician owned web sites, “vein center” generated 45, and “vein laser” generated 49. Only 23 of 98 physician websites described laser ablation, radiofrequency ablation, phlebectomy and sclerotherapy as treatment options. The mean Flesch Kincaid Grade Level (for example, a score of 7.2 would indicate that the text is expected to be understandable by an average student in 7th grade) was 13.42 for “varicose veins,” 14.795 for “vein center,” and 13.941 for “vein laser.” The mean Gunning Fog Index scores were 13.912 for “varicose veins,” 15.213 for “vein center,” and 14.568 for “vein laser.”
CONCLUSIONS: Most websites that detail information on varicose veins are not comprehensive. A minority of websites fully informed patients about their vein treatment options. The material that was present was difficult to read. The mean readability grade level was that of a sophomore in college. Health providers should direct patients to web sites that are easy to read and that clearly outline the breadth of their treatment options.

9:25 AM – 9:30 AM
Q5-14 Metabolic Profiling In Chronic Venous Ulceration Of The Lower Limb - A New Approach To An Old Problem?
R. Velineni, K. Spagou, M. S. Gohel, E. Holmes, A. H. Davies; Imperial College London, London, United Kingdom

BACKGROUND: Chronic venous ulceration (CVU) poses a psychological, physical and social burden to patients and represents a significant financial burden to healthcare providers. Compression bandaging is the cornerstone of current treatment, but ulcer healing is often protracted and recurrence is common. At present, prediction of treatment failure is based on initial ulcer size, ulcer chronicity or patient age. There is no reliable and widely available biomarker to stratify patients.
It is widely accepted that sustained venous hypertension is the underlying cause of CVU. However, how this translates into the syndrome of tissue loss and impaired healing remains unclear. Current knowledge has concentrated on concepts such as fibroblast senescence or specific factors such as cytokines or proteolysis.
Metabolic profiling is a technique examining the end products of cellular function with the use of multivariate statistical models to integrate results in a systems biology model combined with genomic and proteomic data.
We have sought to identify the utility of metabolic profiling in patients with CVU.
METHODS: With ethical committee approval and informed patient consent, ten patients with CVU and the absence of significant arterial disease underwent fluid sampling from ulcers. Fluid sampling involved the placement of sterile absorbent filter disks onto the ulcer and direct aspiration of fluid from under a clear occlusive dressing.
Aqueous and organic metabolites were extracted using a bilayer extraction protocol. Aqueous extracts from filter disks underwent proton nuclear magnetic resonance (1H-NMR) and organic extracts from ulcer fluid and filter disks underwent reverse phase-ultra performance liquid chromatography - mass spectrometry (RP-UPLC-MS). Blank solvents and filter disks were used as controls. Repeat samples were performed in selected cases in order to assess reproducibility.
RESULTS: Ulcer fluid was successfully obtained from 10/10 patients using filter disks and from 9/10 patients using a clear occlusive dressing, with sufficient fluid for analysis obtained in 6/10. Ulcer fluid volume was dependent on ulcer size.
When compared to control samples, distinctive metabolic profiles were demonstrated from filter disks using RP-UPLC-MS and ^{1}H-NMR and from ulcer fluid using RP-UPLC-MS.
RP-UPLC-MS demonstrated separation of the key lipid classes including lysophospholipids, sphingomyelins, phospholipids, fatty acyls and cholesterol esters. ^{1}H-NMR using filter disks demonstrated multiple metabolites including choline, lactate, succinate,

creatine and succinate. These metabolites were absent in control specimens.
Principal component analysis (PCA) confirmed the reproducibility of analysis for repeat samples taken from the same patient.
CONCLUSIONS: This pilot study has demonstrated the feasibility of metabolic profiling in bio-fluid samples from patients with CVU. Further studies are in progress, aiming to build on this work and identify a valid biomarker.

9:30 AM – 10:00 AM
Coffee Break ..... Crescent City Ballroom

10:00 AM – 12:00 PM
PRESIDENT'S SESSION..... Roosevelt Ballroom

10:00 AM – 10:10 AM
2013 Servier Traveling Fellowship Reports
Carson Oostra, MD
Andrea Obi, MD

10:10 AM – 10:20 AM
2013 BSN Jobst Research Grant Interim Report
Xzabia Caliste, MD

10:20 AM – 10:25 AM
Vascular Quality Initiative Update
Jose Almeida, MD

10:25 AM – 10:30 AM
American Venous Forum Foundation Update
Peter J. Pappas, MD

10:30 AM – 10:40 AM
AVF Founding Member Tribute to James DeWeese, MD
John Blebea, MD MBA

10:40 AM – 10:50 AM
AVF Founding Member Tribute to David S. Sumner, MD
Robert B. McLafferty, MD

10:50 AM – 11:00 AM
American Venous Forum Membership Drive
Jose Almeida, MD

11:00 AM – 11:15 AM
Presidential Address Introduction
Fedor Lurie, MD - President-Elect

11:15 AM – 12:00 PM
Presidential Address
Peter K. Henke, MD - President

12:10 PM – 1:10 PM
MEMBER BUSINESS LUNCHEON..... Blue Room

1:20 PM – 2:50 PM
SCIENTIFIC SESSION 6..... Roosevelt Ballroom
Venous Mix
Moderators: William Marston, MD, Colleen Moore, MD

1:20 PM – 1:40 PM

6-27 Differential Metabolic Phenotype Of Human Varicose Veins Tissue And Their Utility In Understanding Disease Pathogenesis And Identifying Potential Prognostic Biomarkers

M. A. Anwar, P. Vorkas, J. Li, J. Shalhoub, C. S. Lim, E. Want, E. Holmes, A. H. Davies; Imperial College London, London, United Kingdom

BACKGROUND: Human metabolic phenotype reflects the genetic and environmental perturbations, both of which predispose to the development of varicose veins (VV). It is considered core to understanding disease pathogenesis, and identification of biomarkers and targets for preventative and therapeutic strategies. This study aims to investigate the key metabolic differences between human varicose and non-varicose veins (non-VV).

METHODS: Varicose vein segments (n=81) were retrieved from patients with primary venous reflux undergoing conventional surgery. Non-VV segments (n=35) were residual conduit veins collected from patients undergoing arterial bypass surgery, carotid endarterectomy and repair of inguinal hernia. Each vein segment underwent sequential aqueous and lipid metabolite extraction. Aqueous and lipid extracts were analysed using 600 MHz ^{1}H Nuclear Magnetic Resonance (NMR, Bruker) spectroscopy and Ultra-Performance Liquid Chromatography-Q-TOF Premier Mass Spectrometer (UPLC-MS, Waters). Multivariate statistical analyses were performed using SIMCA 13 and MATLAB R2009b. Ingenuity pathway analysis software, published literature and online human metabolome database were used to understand the association of significant metabolites with the relevant cellular pathways.

RESULTS: The mean age of VV and non-VV patients were 45 (range 18-82) and 62 years (range 32-85), respectively. Higher concentration of glutamate, taurine and myo-inositol in aqueous extracts and phosphatidylcholine (PC) and sphingomyeline (SM) in lipid extracts were observed in VV group compared with non-VV. These differential metabolites were not correlated with age, gender, hypertension, ischemic heart disease, peripheral arterial disease, and aspirin and statin usage based on Partial Least Squares regression analysis. Pathway analysis based on published literature and online databases revealed association of PC and SM with inflammation and myo-inositol with cellular proliferation.

CONCLUSIONS: This study reports higher concentrations of SM, PC, myo-inositol, glutamate and taurine metabolites in VV tissue extracts. Furthermore, this study proposes PC, SM and myo-inositol metabolites as metabolic phenotype associated with inflammatory and proliferative responses in varicose veins. Future studies should evaluate these metabolites as potential biomarkers for disease prognosis and progression.

1:40 PM – 2:00 PM

6-28 Morphological Changes In The Vein After Different Numbers Of Radiofrequency Ablation Cycles

E. V. Shaidakov[1], A. G. Grigoryan[1], E. A. Ilyukhin[2], D. A. Rosukhovskiy[1], V. L. Bulatov[3]; [1]Institute of Experimental Medicine of the Russian Academy of Medical Sciences, Saint-Petrsburg, Russian Federation, [2]Private surgical clinic "Medalp", Saint-Petrsburg, Russian Federation, [3]Institute of Bioregulation and Gerontology of the Russian Academy of Medical Sciences, Saint-Petrsburg, Russian Federation

BACKGROUND: It has not been clarified yet whether it is possible to decrease the percentage of recurrences after radiofrequency ablation (RFA) by way of increasing the number of the RFA cycles. The aim of this study is to assess the morphological changes in excised vein fragments after performing different durations of RFA exposure.

METHODS: The study was performed on ten patients having a suprafascial segment of the great saphenous vein (GSV) with more than 22 cm in length and a minimum 5 mm in diameter, who had given their consent to intraoperative excision of suprafascial GSV segments after RFA-treatment through four 1 cm long diametrical cuts. Usually thermal ablation in a suprafascial segment results in post-surgery periphlebitis. Therefore, in every day practice we try to excise the suprafascial vein segment even if it was initially RFA-treated. Prior ultra-sound analysis had shown an average 6.9 mm diameter of the suprafascial segments. The segment was divided into three 7 cm long sub-segments and one control segment of a minimum length of 1 cm. The first, second and third segment were treated with three, two and one RFA (ClosureFast) cycles respectively while the control segment was not exposed to RFA at all. After the treatment the segments were excised, placed into a test-tube containing a fixer and were then morphologically analyzed.

The specimens were dyed using Haematoxylin and Orcein. The ensuing analysis was performed by an experienced expert using the blind study method (the specimens were numbered without any hint as to the quantity of RFA cycles performed on them).

RESULTS: The first RFA cycle led to a complete desquamation of the endothelium and a partly homogenization of the vein layers, which affected predominantly the tunica intima. In some segments the homogenization depth expanded to the middle of the tunica media.

After two cycles of radiofrequency ablation of the vein wall the homogenization reached the tunica intima and the tunica media and in some places expanded to the tunica adventitia. We also noted damage to the vein wall structure in the form of cracks.

The third RFA treatment cycle of the vein wall left all vein wall layers completely homogenized. We also revealed basophily of the intercellular substance and structural changes in the vein wall in the form of cracks all along the vein.

CONCLUSIONS: 1) The number of cycles has an impact on the depth of the vein wall damage. 2) One treatment cycle does not cause damage to all layers of the vein wall. 3) Three treatment cycles cause damage to all vein wall layers.

2:00 PM – 2:20 PM

6-29 P-selectin Inhibition Therapeutically Promotes Thrombus Resolution And Prevents Vein Wall Fibrosis Better Than Enoxaparin And An Inhibitor To Von Willebrand Factor

J. A. Diaz[1], S. K. Wrobleski[1], A. R. Pechota[1], A. E. Hawley[1], K. J. Roelofs[1], N. K. Doornbos[1], J. E. Gabriel[1], G. Reynolds[1], P. Lester[1], F. Londy[1], S. Lowe[1], P. K. Henke[1], R. G. Schaub[2], T. W. Wakefield[1], D. D. Myers[1]; [1]University of Michigan, Ann Arbor, MI, [2]4NKT Therapeutics, Inc., Waltham, MA

BACKGROUND: P-selectin (P-sel) and von Willebrand factor (VWF) promote venous thrombosis (VT). Aptamers are oligonucleotides targeting protein/protein interactions like P-sel, VFW and their ligands. This study tested the therapeutic effects of aptamers against P-sel and VWF compared to a low molecular weight heparin, enoxaparin, on experimental VT.
METHODS: Male juvenile baboons underwent experimental iliac VT. Occlusive thrombus was created and confirmed on day 0, and treatment initiated 2 days post VT. Treatment groups included: Controls with no treatment (n=3); anti-P-sel aptamer ARC5692 (2mg/kg IV + 1mg/kg SQ), then 1 mg/kg SQ twice a day until euthanasia on day 21 (n=3); anti-VWF Aptamer ARC15105 (250µg/kg IV), then single doses of 250µg/kg IV on days 6, 10, and 14 (n=3); and enoxaparin 1.5mg/kg SQ daily until day 21 post VT. Coagulation tests, hematology, magnetic resonance venography, contrast venography and ultrasonography were performed on days 0, 2, 6, 14, and 21. At 21 days IVC and iliac veins were harvested for histology. Therapeutic levels of drugs were confirmed by HPLC and Xa.
RESULTS: P-sel inhibition (ARC5692) resulted in a significant improvement in percent vein reopening and vein valve competency with less vein wall fibrosis, as measured by percent collagen deposition obtained on trichrome analysis, compared to enoxaparin and anti-VWF aptamer. Additionally, P-sel inhibition resulted in no elevation of coagulation functions **(see table).**

CONCLUSIONS: P-selectin inhibition therapeutically promotes thrombus resolution and prevents vein wall fibrosis better than enoxaparin and an inhibitor to von Willebrand factor. P selectin inhibition exhibits an improved therapeutic benefit over the current standard of care and thus should undergo future clinical trials for the treatment of VT.

Table		Control	P-sel inhibitor	Enoxaparin	VWF inhibitor
MRV-Percent Reopening	(after total thrombosis)	13%	↑ 73%	42%	0%
Vein Valve Competence	(after total thrombosis)	0%	33%	33%	0%
Fibrosis	(% collagen deposition)	46%	↓ 39%	54%	49%
aPTT	(sec, range 21 - 45)	40	43	↑ 56	41
Bleeding Time	(min, range 1-8)	5	4	↑ 10	↑ 20

Note: Arrows indicate significant increase or decrease, $p \leq 0.05$.

2:20 PM – 2:40 PM

6-30 Regional And Systemic Pro-thrombotic Biomarkers In Varicose Vein Patients And Healthy Controls

C. R. Lattimer[1], E. Kalodiki[1], M. Azzam[1], G. Geroulakos[1], J. Fareed[2], D. Hoppensteadt[2]; [1]Ealing Hospital & Imperial College, Middlesex, United Kingdom, [2]Loyola University Medical Centre, Maywood, IL

BACKGROUND: The relationship between thrombosis and varicose veins is poorly understood. Varicose veins are seen in approximately 50% of patients with post-thrombotic syndrome and may be a risk factor for thrombosis. Furthermore, hemostatic markers are assessed usually from arm blood. Re-circulating leg blood may be different in varicose veins. The aim of this study was to determine whether prothrombotic biomarkers varied between patients with varicose veins and healthy controls and whether standard venous samples from the arm differed from leg samples.
METHODS: This was a prospective study on 24 patients (17 male, median age 45 years (range: 25-91 years)) awaiting saphenous laser ablation and 24 healthy volunteers (17 male, median age 42 years (range:24-89 years)) without venous disease. The clinical CEAP distribution was: C2=6,C3=4,C4a=1,C4b=6,C5=5,C6=2, with a median VCSS and refluxing saphenous vein diameter of 6(4-10) and 8.2(6-12)mm, respectively. Five mL of venous blood was taken from the ante-cubital fossa, with a concurrent sample from a varicose tributary (patients) or foot vein (volunteers). The following tests were performed: thrombin-antithrombin (TAT) ng/mL, anti-thrombin III (ATIII) % activity, microparticles (MP) nM, fibrinogen mg/dL, prothrombin fragments 1.2 (F1.2) pmol, P-selectin ng/mL and dilute Russell's viper venom time (DRVVT) sec. The data were analysed using the Wilcoxon test (same subject) and the Mann-Whitney test (different subjects).
RESULTS: Significant differences (**) were observed between patients and controls as well as between arm and leg samples in all of the hemostatic markers, except fibrinogen (Table 1). As depicted in Fig 1, TAT levels differed significantly from the control arm sample when compared against patients with varicose veins or leg samples. Evidence to support an increase in thrombotic activity in varicose vein patients is from statistically elevated TAT, ATIII and F1.2. However, the relationship was inverse with MP and DRVVT. Evidence to support an increase in thrombotic activity in legs > arms is from statistically elevated TAT levels. However, the relationship was significantly inverse with ATIII and F1.2.
CONCLUSIONS: There is conflicting evidence for thrombosis risk assessment by elevated venous biomarkers in patients with varicose veins or leg samples. However, the differences observed between arm and leg samples require explanation. Venous leg sampling opens up a new anatomical site of investigation which may have future clinical value.

Table 1: P-values of hemostatic markers comparing patients with controls and arms with legs				
	PATIENT	CONTROL	ARM	LEG

	Arm vs Leg	Arm vs Leg	Patient vs Control	Patient vs Control
TAT (ng/mL)	.415	.015 **	.038 **	.585
AT III (% activity)	.001 **	.201	.003 **	.007 **
MP (nM)	.819	.116	.543	.020 **
Fibrinogen (mg/dL)	.749	.128	.409	.173
F1.2 (pmol)	.587	.028 **	.386	.026 **
P-Selectin (ng/mL)	.044 **	.007 **	.108	.606
DRVVT (sec)	.091	.097	.048 **	.205

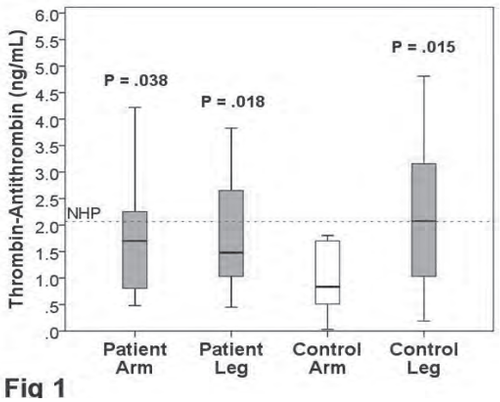

Fig 1

Figure 1: The TAT levels in the normal control subjects were significantly lower than the levels in varicose vein patients and in the control legs.

2:40 PM – 2:45 PM

Q6-15 Transvascular Autonomic Modulation: Novel Venous Therapy For Autonomic Dysfunction

M. Arata[1], Z. Sternberg[2]; [1]Synergy Health Concepts, Newport Beach, CA, [2]Department of Neurology, Buffalo Medical Center, Buffalo, NY

BACKGROUND: Chronic cerebrospinal venous insufficiency (CCSVI) has been described as a condition resulting from impaired CNS venous drainage. Venous balloon angioplasty (BA) has been performed as a treatment for CCSVI. Autonomic nervous system (ANS) dysfunction has been proposed as mechanism underlying the occurrence of CCSVI. We hypothesize that the BA effect on clinical parameters is mediated by mechanical stimulation of perivascular autonomic fibers and is independent of vascular obstruction. The purpose of this study is to describe Trans-Vascular Autonomic Modulation (TVAM) in multiple sclerosis (MS) patients as a means of improving ANS dysfunction, comparing its safety and efficacy to the traditional BA.
METHODS: Twenty-one MS patients who presented with symptoms of cardiovascular ANS dysfunction underwent TVAM. These patients were compared with twenty MS patients who presented with CSSVI, and who underwent traditional BA.
TVAM deviated from traditional BA in that target veins, bilateral internal jugular, azygos and left renal veins, were each dilated regardless of the presence of vascular abnormalities. This also included treatment of patients without evidence of abnormality in any of the target veins, eliminating the possibility of vascular effect. The improvement in cardiovascular ANS function was indicated by determining R-R interval variations during deep breathing (MCR, E/I ratio), valsalva maneuver (valsalva ratio), and postural changes (30:15 postural ratio).
RESULTS: The safety profile of the TVAM procedure was similar to that of the traditional BA with no adverse events occurring in either group. However, TVAM increased MCR, E/I ratio, and postural ratio more significantly than the traditional BA. Post-intervention, improvements were seen in the TVAM group relative to baseline for MCR (3.34±0.41 vs. 2.44±0.48, 36.4%, P = 0.08), E/I ratio (1.11±0.01 vs. 1.09±0.01, 1.8%, P = 0.3), valsalva ratio (1.95±0.09vs. 1.74±0.09, 12%, P = 0.10) and postural ratio (1.36±0.08 vs. 1.04±0.09, 30.7%, P = 0.027).
The postural ratio response in the TVAM group relative to baseline (1.36±0.08 vs. 1.04±0.09, 30.7%, P = 0.027) demonstrated the largest change relative to post-intervention postural ratio in the control group (1.36±0.08vs. 1.167±0.03, 16.5 %, P = 0.016).
CONCLUSIONS: TVAM mediated deposition of mechanical energy to central veins by balloon dilation, including anatomically normal veins, can improve indicators of ANS dysfunction. The observed safety and efficacy of TVAM is encouraging, paving the way for the treatment of ANS dysfunction in pathological states other than MS. Further studies should investigate the response to TVAM in larger cohort.

2:45 PM – 2:50 PM

Q6-16 Characterization Of A Bioprosthetic Bicuspid Venous Valve Hemodynamics And Implications For Mechanism Of Valve Dynamics

H. Chen[2], W. Tien[1], Z. Berwick[2], J. Krieger[3], S. Chambers[3], D. Dabiri[1], G. Kassab[4]; [1]University of Washington, Seattle, WA, [2]3DT Holdings, LLC, Indianapolis, IN, [3]COOK® Medical, Bloomington, IN, [4]Indiana University School of Medicine, Indianapolis, IN

BACKGROUND: Chronic venous insufficiency (CVI) of the lower extremities is a common medical problem. Although bioprosthetic valves have been proposed to treat severe reflux, the clinical success has been limited due to thrombosis and hyperplasia. A bioprosthetic valve that mimics a native valve in performance is essential.
METHODS: A coupled two-way Fluid-structure Interaction (FSI) model using nonlinear hyper-elastic strain energy density function to simulate the prosthetic valve was developed to simulate the interaction of valve structure with the surrounding flow. The

simulation results were validated by experiments of a bioprosthetic bicuspid venous valve using Particle Image Velocimetry (PIV) with high spatial and temporal resolution.
RESULTS: Velocity fields surrounding the valve leaflets were calculated from PIV measurements and comparisons to the FSI simulation results were made. Both the spatial and temporal results of the simulations and experiments were in excellent agreement. Stagnation or stasis regions behind the leaflet were observed in both simulations and experiments in this specific design. Analysis of the pressure differential across valve and forces on the leaflets from the FSI simulations showed the valve mechanism under the test conditions to be pressure-driven.
CONCLUSIONS: The FSI simulation and force analysis showed that the valve is pressure driven under the testing conditions. Both simulation and experimental results were highly consistent and in agreement with the observations from previous studies. The detailed velocity fields shown by both FSI simulation and PIV measurements also demonstrated that the flow behind the leaflet is mostly stagnant and is likely a source for thrombosis. Hence, successful future valve designs must eliminate the flow stagnations.

2:50 PM – 3:15 PM
Coffee Break ..... Crescent City Ballroom

3:15 PM – 4:30 PM
SPECIALTY SYMPOSIA
(A) Deep Venous Disease ..... Roosevelt Ballroom
Chair: Suresh Vedantham, MD

The Deep Venous Disease Symposium at the AVF Annual Meeting will address some of the most challenging aspects of deep vein care. What are the pre-requisites for long-term success in managing extensive acute DVT? How can physiological testing augment a physician's approach to the management of chronic deep venous disease? What surgical interventions actually work for patients with chronic iliofemoral thrombosis? And how are physicians and the AVF working together to lay the groundwork for ensuring quality care and improved venous outcomes? "The AVF has a wonderful and growing tradition of multidisciplinary collaboration in education. This session will feature an outstanding and diverse array of talented DVT experts from interventional radiology, vascular surgery, and cardiovascular medicine tackling the problems we find in those patients in most need of help in our practices. We expect our attendees to leave with greater confidence in their ability to manage the toughest clinical scenarios," says session chair Dr. Suresh Vedantham, Professor of Radiology & Surgery at the Washington University School of Medicine.

Optimizing Benefit for Patients with Acute DVT
Akhilesh Sista, MD

Beyond Ultrasound - Physiological Testing to Guide Deep Venous Therapy
Suman Rathbun, MD

Contemporary Role of Venous Reconstruction in Post-Thrombotic Syndrome
Elna M. Masuda, MD

DVT Treatment - Data, Outcomes, and Opportunities
Suresh Vedantham, MD

(B) Vascular Medicine & Thrombosis ..... Chambers 1 & 3
Chair: Thom Rooke, MD

"During this year's Annual Meeting of the AVF I will have the pleasure of moderating a session devoted to vascular medicine topics," says session chair Dr. Thom Rooke, consultant at Mayo Clinic. Participants will include Steve Dean from The Ohio State University and Dr. Teresa Carman from Case Western Reserve. Dr. Dean is widely recognized by the Vascular Medicine community as THE expert in unusual or atypical vascular disorders. He is an extremely popular speaker known for his dynamic – and always visually interesting – presentations involving things that are unusual, rare, or downright bizarre. Dr. Dean is about to publish a medical atlas of vascular diseases that will showcase his extensive collections of oddities. His talk on "Unusual Cases of Venous Thromboembolic Disease" is sure to be a crowdpleaser. Dr. Carman is a well respected vascular medicine practitioner with a reputation for teaching excellence and a strong interest in thrombotic problems. Her topic, "Warfarin Failure," will address an issue that is gaining wide attention as new, novel oral anticoagulants enter the market. It is precisely the type of talk one expects from a nonsurgical practitioner working in the vascular field, and it will showcase her impressive expertise in this area. Time permitting, the moderator will present a short discussion of heparin induced thrombocytopenia – a condition that continues to pose a problem for every practitioner who deals with patients that require acute anticoagulation. It promises to be an informative, interesting, and useful session.

Unusual Cases of Venous Thromboembolic Disease
Steven Dean, MD

Warfarin Failure
Teresa Carman, MD

Heparin-Induced Thrombosis
Thom Rooke, MD

(C) Wound Care, Lymphedema & Compression ..... Orpheum Room
Chair: Colleen Moore, MD

The session on lymphedema and compression is designed to update participants on the recent scientific advances in compression therapy and lymphedema. Dr. Manju Kalra will discuss strategies for improved patient compliance and improved patient selection for different methods of compression. New advances in lymphedema management, including surgical interventions will be addressed by Dr. Audra Duncan. Dilemas of treating patients with concomitant venous and lymphatic disease will be discussed by Dr. Kathleen Oszvath. “Our goal is to provide practical solutions to problems encountered in vascular surgery clinics every day,” says Dr. Colleen Moore.

Treating Concomitant Venous and Lymphatic Disease
Kathleen Ozsvath, MD

Surgical Options for Lymphedema
Audra Duncan, MD

The Role of Lymphatic Pumps/Compression: Strategies for Improving Compliance
Colleen Moore, MD & Manju Kalra, MD

(D) Animal Models in Venous Research ..... Chambers 2 & 4
Chair: José Antonio Diaz, MD

Animal models of venous thrombosis (VT) have been used for many years and have highly contributed to the current understanding of VT biology. Over the past two decades, several models of VT have been developed, and particularly, Indiana University – Purdue University’s laboratory has vast experience in the IVC ligation model in mice, rats, and the bi-balloon VT model in baboons. Currently, it is debated whether thrombogenesis associated with any animal model correlates with spontaneous VT formation in humans, and/or is there one specific model that is the most accurate or representative of the disease. Oftentimes, investigators from different backgrounds are subject to contradictory debates regarding the same VT animal models. Moreover, these debates are reflected in subjective judgment of manuscripts and grant reviews, which impedes the efforts of investigators throughout their process of understanding VT. Leaders in animal models of VT have been invited to the Annual Meeting in order to initiate a public discussion in the format of a Specialty Symposium regarding the advantages and disadvantages of such models.

The Use of the Stasis-IVC Ligation Model in Venous Research
Thomas Wakefield, MD

The Use of the St Thomas-IVC Stenosis Model in Venous Research
Prakash Saha, MD

The Use of the Baboon Model in Venous Research
Daniel Myers, DVM

The Use of the Electrolytic IVC Model (EIM) in Venous Research
José Antonio Diaz, MD

Technical Aspect for Successful Research in Studying Varicose Veins - Ex Vivo Experimentation and Animal Models
Joseph D. Raffetto, MD

4:30 PM – 4:45 PM
Break

4:45 PM – 6:00 PM

SPECIALTY SYMPOSIA

(E) Superficial Veins Done Differently ..... Roosevelt Ballroom

Chair: Steven Elias, MD

This session will be both didactic and interactive. Presenters will briefly discuss the topic with current data and practice techniques. A brief case will be presented as well. The attendees will then discuss their experience with each topic. A give and take of ideas and techniques are welcome and expected. Attendees will understand the need and challenges of incorporating the management of cosmetic vein disease into an academic practice. The symposium will educate attendees on the various treatment options for the management of superficial thrombophlebitis and the technical obstacles of endovenous ablation and how to best overcome them utilizing advanced techniques.

Cosmetic Superficial Disease in an Academic Practice: Is it Worth it?
Ellen Dillavou, MD

EVA: Advanced Techniques and Technical Pearls
Steven Elias, MD

Superficial Thrombophlebitis
Peter J. Pappas, MD

Gluteal/Thigh/Labial Varicose Veins
Jennifer Heller, MD

(F) Vascular Medicine & Thrombosis..... Chambers 1 & 3

Chair: Thom Rooke, MD

"During this year's Annual Meeting of the AVF I will have the pleasure of moderating a session devoted to vascular medicine topics," says session chair Dr. Thom Rooke, consultant at Mayo Clinic. Participants will include Steve Dean from The Ohio State University and Dr. Teresa Carman from Case Western Reserve. Dr. Dean is widely recognized by the Vascular Medicine community as THE expert in unusual or atypical vascular disorders. He is an extremely popular speaker known for his dynamic – and always visually interesting – presentations involving things that are unusual, rare, or downright bizarre. Dr. Dean is about to publish a medical atlas of vascular diseases that will showcase his extensive collections of oddities. His talk on "Unusual Cases of Venous Thromboembolic Disease" is sure to be a crowdpleaser. Dr. Carman is a well respected vascular medicine practitioner with a reputation for teaching excellence and a strong interest in thrombotic problems. Her topic, "Warfarin Failure," will address an issue that is gaining wide attention as new, novel oral anticoagulants enter the market. It is precisely the type of talk one expects from a nonsurgical practitioner working in the vascular field, and it will showcase her impressive expertise in this area. Time permitting, the moderator will present a short discussion of heparin induced thrombocytopenia – a condition that continues to pose a problem for every practitioner who deals with patients that require acute anticoagulation. It promises to be an informative, interesting, and useful session.

Unusual Cases of Venous Thromboembolic Disease
Steven Dean, MD

Warfarin Failure
Teresa Carman, MD

Heparin-Induced Thrombosis
Thom Rooke, MD

(G) Wound Care, Lymphedema & Compression..... Orpheum Room

Chair: Colleen Moore, MD

The session on lymphedema and compression is designed to update participants on the recent scientific advances in compression therapy and lymphedema. Dr. Manju Kalra will discuss strategies for improved patient compliance and improved patient selection for different methods of compression. New advances in lymphedema management, including surgical interventions will be addressed by Dr. Audra Duncan. Dilemmas of treating patients with concomitant venous and lymphatic disease will be discussed by Dr. Kathleen Oszvath. "Our goal is to provide practical solutions to problems encountered in vascular surgery clinics every day," says Dr. Colleen Moore.

Treating Concomitant Venous and Lymphatic Disease
Kathleen Ozsvath, MD

Surgical Options for Lymphedema
Audra Duncan, MD

The Role of Lymphatic Pumps/Compression: Strategies for Improving Compliance
Colleen Moore, MD & Manju Kalra, MD

(H) Biomechanics of Venous Valves: In Silico, In Vitro and In Vivo ..... Chambers 2 & 4
Chairs: Ghassan Kassab, MD, Fedor Lurie, MD

The "Biomechanics and Bioengineering" Session at AVF was initiated in 2012 by past AVF President Dr. Seshadri Raju to bring basic science and analytical engineering approaches to bear on clinical venous problems. Professors Roger Kamm and Geert Schmid- Schonbein chaired the well attended inaugural session. The objective was to stimulate understanding and collaborations between basic scientists, engineers and clinicians to address important issues in venous health care. In the spirit of this initiative, the 2014 session will be devoted to venous valves where basic science, engineering, and clinical knowledge will be interfaced to highlight native valve function, role of valves in venous disease and treatment methods (surgical, prosthesis, stenting, etc.).

Quantifying Saphenous Reflux
Seshadri Raju, MD

Observations of Venous Valves In-Vivo: Structure Function Relation
Fedor Lurie, MD

New Trends in Valvular Tissue Modeling and Applications
Michael Sacks, MD

Neovalve Surgery and Potential for a Percutaneous Future
Antonio Rosales, MD

Novel Prosthetic Venous Valve: A Biomechanical Approach
Zachary Berwick, MD

7:00 PM – 10:00 PM
MARDI GRAS SOIRÉE..... Waldorf Astoria Ballroom

Mardi Gras Soirée

Join the AVF and Foundation leadership at the Mardi Gras Soirée on Friday evening for a cocktail reception, awards ceremony, New Orleans cuisine and a live New Orleans jazz band. This is a great way to network with international colleagues and leaders in the venous field. Featuring the Flavors of New Orleans, an exceptional dance band playing jazz, zydeco, Mardi Gras music, funky New Orleans favorites, and classic party music. Don't forget to bring your favorite Mardi Gras Masks!

Awards to be presented at the Mardi Gras Soirée include:

- Founder's Award
- Best Paper Award
- Best Poster Awards
- Servier Traveling Fellowship
- 2014 BSN-JOBST Research Grant

Join us on Friday, February 21st

Come enjoy the flavors and music of Mardi Gras!

ALABAMA
Alrefai, Basel
Isobe, James Hajime
Kingsley, John R.
Lee, Timothy C.
Lochridge, Stanley K.
McPhillips, Frank L.
Passman, Marc A.
Sirk, Rodney A.

ARIZONA
Dragon, Jimmy H.
Elliott, Thomas R.
Favata-Moxley, Kelli R.
Fleck, Robin M.
Giangobbe, Mitchell J.
Greenfield, Lazar J.
Hunter, Glenn C.
Leon, Luis R.
Morrison, Nick
Puggioni, Alessandra
Size, Gail P.
Thorpe, Patricia E.

ARKANSAS
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4:00 PM – 8:00 PM	Registration Open	Roosevelt Foyer
WEDNESDAY, FEBRUARY 19		
7:00 AM – 6:30 PM	Registration Open	Roosevelt Foyer
7:00 AM – 8:00 AM	Continental Breakfast	Roosevelt Promenade
7:00 AM – 8:00 AM	Industry Appreciation Breakfast	Chambers 1 & 3
7:00 AM – 8:00 AM	Vascular Insights Industry Symposium*	Chambers 2 & 4
8:00 AM – 12:00 PM	David S. Sumner Venous Summit	Roosevelt Ballroom
12:00 PM – 7:30 PM	Exhibit Hall Open	Crescent City Ballroom
12:00 PM – 1:00 PM	Break	
12:00 PM – 1:00 PM	Cook Medical Industry Symposium*	Chambers 1 & 3
1:00 PM – 6:00 PM	Poster Hall Open	Waldorf Astoria Ballroom
1:00 PM – 1:05 PM	President & Annual Meeting Chair Welcome	Roosevelt Ballroom
1:05 PM – 3:03 PM	Scientific Session 1: Superficial Vein Disease 1	Roosevelt Ballroom
3:03 PM – 3:30 PM	Coffee Break	Crescent City Ballroom
3:30 PM – 5:30 PM	Scientific Session 2: Chronic Venous Obstructions 1	Roosevelt Ballroom
6:00 PM – 7:30 PM	Welcome Reception	Crescent City Ballroom
7:30 PM – 9:30 PM	Tactile Medical Industry Symposium*	Blue Room
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6:30 AM – 7:00 PM	Registration Open	Roosevelt Foyer
7:00 AM – 4:00 PM	Exhibit Hall Open	Crescent City Ballroom
7:00 AM – 8:00 AM	Continental Breakfast	Crescent City Ballroom
7:00 AM – 8:00 AM	New Member Breakfast with the Board	Orpheum Room
7:00 AM – 8:00 AM	Intro to AVF Guest Breakfast	Blue Room
8:00 AM – 6:30 PM	Poster Hall Open	Waldorf Astoria Ballroom
8:00 AM – 10:00 AM	Scientific Session 3: Venous Thromboembolism/IVC Filters	Roosevelt Ballroom
10:00 AM – 10:30 AM	Coffee Break	Crescent City Ballroom
10:30 AM – 12:00 PM	ACP Symposium – The Evaluation of Non-Truncal Varicose Veins of the Lower Extremities	Roosevelt Ballroom
12:00 PM – 12:15 PM	Boxed Lunch	Roosevelt Promenade
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1:15 PM – 3:15 PM	Scientific Session 4: Chronic Venous Obstructions 2	Roosevelt Ballroom
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3:40 PM – 4:20 PM	Best Paper Session	Roosevelt Ballroom
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7:30 PM – 9:00 PM	BTG International, Inc. Industry Symposium*	Blue Room
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7:00 AM – 4:30 PM	Exhibit Hall Open	Crescent City Ballroom
7:00 AM – 8:00 AM	Continental Breakfast	Crescent City Ballroom
7:00 AM – 8:00 AM	UIP Symposium: Guidelines and Consensus of UIP	Roosevelt Ballroom
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10:00 AM – 12:00 PM	President's Session	Roosevelt Ballroom
12:10 PM – 1:10 PM	Member Business Luncheon	Blue Room
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	(B) Vascular Medicine & Thrombosis	Chambers 1 & 3
	(C) Wound Care, Lymphedema & Compression	Orpheum Room
	(D) Animal Models in Venous Research	Chambers 2 & 4
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	(F) Vascular Medicine & Thrombosis	Chambers 1 & 3
	(G) Wound Care, Lymphedema & Compression	Orpheum Room
	(H) Biomechanics of Venous Valves: In Silico, In Vitro and In Vivo	Chambers 2 & 4
7:00 PM – 10:00 PM	Mardi Gras Soiree	Waldorf Astoria Ballroom
*Industry Symposia are not part of the official program of the AVF 26th Annual Meeting.		

SAVE *the* DATE

Palm Springs 2015

American Venous Forum

27th Annual Meeting

February 25-28, 2015

Westin Mission Hills Golf Resort & Spa