

**CANADIAN SOCIETY FOR VASCULAR SURGERY
SOCIÉTÉ CANADIENNE DE CHIRURGIE VASCULAIRE**

35th Annual Meeting on Vascular Surgery

**September 13-14, 2013
The Westin Edmonton Hotel
Edmonton AB**

Final Program/Programme Final

A nighttime photograph of the Edmonton skyline, Alberta, Canada. The city lights are reflected in a river in the foreground. The sky is dark with some clouds, and the overall scene is illuminated by the warm glow of city lights.

Please visit the exhibit hall and meet the 2013 CSVS sponsors

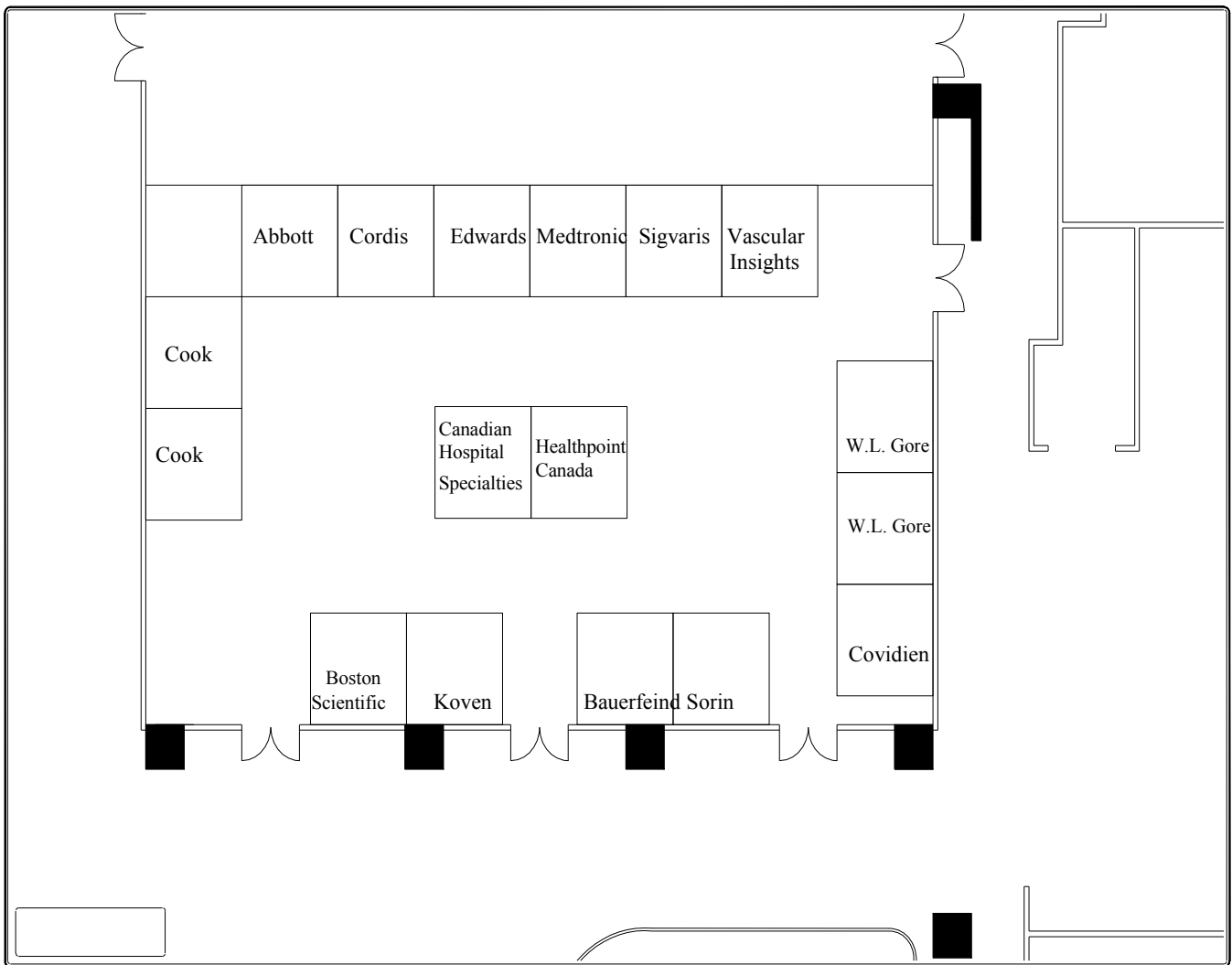
Exhibiting companies are our benefactors and major resource for our annual meetings. Members and guest delegates are invited and encouraged to visit and support our sponsors.

Exhibit dates and times:

Friday, September 13th
0700-1700

Saturday, September 14th
0700-1630

BC/ALBERTA/YUKON ROOM



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President Elect – Dr. Jacques Tittley
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Past Past President - Dr. Jerry Chen
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Our sincere thanks for their efforts.

CANADIAN SOCIETY FOR VASCULAR SURGERY INVITED GUEST LECTURERS

1980 Charles Rob	1996 Bruce Gewertz
1981 Robert Rutherford	1997 Peter Gloviczki
1982 Lazar Greenfield	1998 Kaj Johansen
1983 H.H.G. Eastcott	1999 John W. Hallet
1984 John Bergan	2000 Peter Harris
1985 John Mannick	2001 Andrew Whittemore
1986 Allan Callow	2002 Jack Cronenwett
1987 Robert Courbier	2003 Wesley Moore
1988 D. Eugene Strandness Jr.	2004 James May
1989 Edward Diethrich	2005 Robert Hobson II
1990 Ronald Stoney	2006 Eric L. Verhoeven
1991 Roger Greenhaigh	2007 Timothy A.M. Chuter
1992 Thomas O'Donnell	2008 Michel Makaroun
1993 Jonathan Towne	2009 Peter A. Schneider
1994 James Yao	2010 Gregory Moneta
1995 Robert Leather	2011 Benjamin Starnes
	2012 Daniel Clair

PREVIOUS MEETINGS

1979 Montreal	2004 Quebec City
1980 Ottawa	2005 Toronto
1981 Toronto	2006 Calgary
1982 Quebec	2007 Montreal
1983 Calgary	2008 Saskatoon
1984 Montreal	2009 Ottawa
1985 Vancouver	2010 Vancouver
1986 Toronto	2011 St. John's
1987 Winnipeg	2012 Quebec City
1988 Ottawa	
1989 Edmonton	FUTURE MEETINGS
1990 Toronto	2014 Toronto
1991 Quebec	2015 Victoria
1992 Ottawa	2016 Halifax
1993 Vancouver	
1994 Toronto	
1995 Montreal	
1996 Halifax	
1997 Vancouver	
1998 Toronto	
1999 Quebec City	
2000 Banff	
2001 Ottawa	
2002 Halifax	
2003 Victoria	

A History of the Canadian Society for Vascular Surgery

Allan R. Downs, Anthony J. Salvian (Original Publication – 2003)

Founding of the Canadian Society for Vascular Surgery

Following discussions with Dr. R. B. Salter, President of the Royal College of Physicians and Surgeons of Canada, in the spring of 1976, an open meeting was held during the Royal College Annual Meeting in Toronto, January 28, 1977. A mailing list had been developed through Dave Stronach of Brent Surgical and over 100 General, Thoracic, and Cardiac Surgeons were invited to the open meeting. There was an excellent attendance and Wayne Johnston and Allan Downs received a mandate to proceed with the proposal for a Canadian Vascular Society. A nucleus committee was formed with representation from all provinces. The members were Wally Chung (British Columbia), George Bondar (Alberta), Danny McFadden (Saskatchewan), Allan Downs (Manitoba), Wayne Johnston (Toronto), John Provan (Toronto), Walter Waddell (Ottawa), Fernand Laurendeau (Montreal), Doug Miller (New Brunswick), Hugh Simms (Nova Scotia), James Symes (Montreal), and Earl Wright (Newfoundland).

The founding meeting was held on January 26, 1978, during the Royal College meeting in Vancouver. Unfortunately, Earl Wright of Newfoundland was unable to attend, but all other provinces were represented. The bylaws, drafted by Wayne Johnston, were passed. The objectives were outlined and agreed upon. There was no mention of the certificate of competence at this founders' meeting. The objectives of the Society were as follows:

- To provide a forum for Canadian Surgeons treating patients with Vascular Disease
- To maintain and improve standards of care to patients with Vascular Disease
- To monitor standards of care for patients with Vascular Disease through a National Registry
- To establish educational standards for training programs in Vascular Disease
- To provide continuing education programs in Vascular Disease
- To promote research programs in Vascular Disease
- To represent the views of Vascular Surgeons of Canada

The executive was appointed: Allan Downs, President; Wayne Johnston, Secretary; John Provan, treasurer; Danny McFadden was appointed Archivist. Walter Waddell was the program chair for our first scientific meeting with the Royal College in February 1979 in Montreal. After the founding meeting, a membership application was sent to all General and Cardiovascular and Thoracic (CVT) Surgeons with Royal College qualifications. By the time of the February 1979 meeting in Montreal, there were 124 paid members. The Canadian Society for Vascular Surgery had been born. Professor Charles Rob was the first Invited Guest Lecturer.

Accomplishments of the Society

Twenty-five years ago a group of dedicated, forward-thinking academic and clinical surgeons saw the need for a society that would allow for the collegial association of surgeons interested in the investigation and treatment of patients with peripheral vascular diseases. They felt this was necessary to promote development of core groups that could gain clinical expertise in the

management of this difficult group of patients, share and nurture basic and clinical research, and develop training programs for those who would go on to practice this rapidly developing and challenging area of medicine. As a result of their efforts, the Society has become an internationally respected association providing a forum for cutting edge research and has promoted studies that are widely respected and quoted in the international literature. The Society has allowed for crosspollination of ideas and indeed migration of Surgeons throughout Canada and has directly led to the development of Royal College examinations leading to a Certificate of Special Competence in Peripheral Vascular Surgery.

There are now ten Royal College certified training programs in Canada spread out across the country training highly respected academic and clinical Vascular Surgeons. Vascular Surgery continues to evolve and maintains its unique role as a specialty that encompasses not only the surgical management of atherosclerosis but also provides conservative therapy and non-operative endovascular therapies in this very challenging group of patients. The Canadian Society for Vascular Surgery continues to be the Canadian forum where these specialists can present their work, consult with their colleagues, and remain abreast of the current and most up-to-date management of these patients.



CSVS VISION

To Lead Vascular Care in Canada

CSVS MISSION

The Canadian Society for Vascular Surgery is dedicated to excellence in the promotion of vascular health for Canadians through education, research, collaboration and advocacy

Educational Objectives of the CSVS 35th Annual Meeting September 13 - 14, 2013

1. The participant will be able to discuss new knowledge and advances in vascular surgery and learn how these advances can be incorporated into one's daily practice.
2. The participant will be able to describe critical issues in preoperative, intraoperative and postoperative imaging after endovascular aortic repair.
3. The participant will be able to describe factors affecting procedure and patient outcomes for a variety of vascular conditions including carotid disease, aortic aneurysm, peripheral atherosclerosis, chronic venous disease and surgery for dialysis access.
4. The participant will be able to list and describe contemporary issues in the training and education of vascular surgeons.
5. The participant will have an understanding of a variety of unusual/rare vascular conditions.
6. The participant will be able to describe the role of value-based healthcare financing and understand the potential benefits of national outcomes registry participation.
7. The participant will be able to list his/her own gaps in knowledge by participating in the VSEP Jeopardy contest.

The program will provide scientific or clinical presentations by the general membership and will provide the opportunity for the participant to discuss and contribute opinions and evaluations. Authors of accepted abstracts are encouraged to submit manuscripts for peer-reviewed publication.

This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of The Royal College of Physicians and Surgeons of Canada, approved by the Canadian Society for Vascular Surgery. **The maximal CME credit is 12.75 hours.**

CSVS PROGRAM AT A GLANCE

Thursday, September 12 jeudi le 12 septembre 2013	
12h00 13h00	CSVS Executive Committee Luncheon (<i>closed</i>) - <i>Chancellor</i>
13h00 17h00	CSVS Executive Committee Meeting (<i>closed</i>) - <i>Chancellor</i>
14h00 19h00	Exhibitor Set Up
17h00 20h00	RCVSC Vascular Surgery Specialty Committee Meeting (<i>closed</i>) - <i>Chairman</i>
18h00 20h00	CSVS Registration Desk Opens - <i>Top Escalator</i> <i>Ouverture du bureau d'inscription de la SCCV</i>
Friday, September 13 vendredi le 13 septembre 2013	
07h00	CSVS Registration Desk Opens - <i>Top Escalator</i> <i>Ouverture du bureau d'inscription de la SCCV</i>
07h00 07h45	Continental Breakfast - <i>Foyer</i>
07h45 08h00	Welcome and Opening Remarks - <i>Manitoba/Saskatchewan</i> President: Dr. Gerrit Winkelaar Program Chair: Dr. Karim Alibhai Secretary: Dr. Greg Browne
08h00 09h30	Paper Session I: Aortic Intervention - <i>Manitoba/Saskatchewan</i> <i>Moderators: Dr. Gerrit Winkelaar, Dr. Karim Alibhai</i> <i>Objectives: Upon completion of this session, attendees will be able to:</i> <ol style="list-style-type: none"> 1. <i>Describe issues related to endovascular aortic aneurysm repair</i> 2. <i>Understand complications and pitfalls associated with endovascular repair of aortic pathology</i> 0815-0830 The Predictive Role of Negative Initial Imaging for the Development of an Endoleak after Infrarenal Endovascular Aortic Aneurysm Repair <i>Presenter: H. Gill</i> 0815-0830 Transesophageal Echocardiogram and use of Contrast During Proximal Aortic Endograft Placement: a Comparison of Contrast TEE with Completion Aortogram and Postoperative CT Angiography <i>Presenter: M.E. MacDonald</i> 0830-0845 Surgeon efficiency is the most important predictor of Fluoroscopy duration: Anatomic

	<p>and procedural determinates of fluoroscopy times during elective EVAR- <i>Presenter: R. Ruz</i></p> <p>0845-0900 Iliac Branch Device Procedures: Does Anatomy Matter? - <i>Presenter: D. Jiang</i></p> <p>0900-0915 Predictors of Abdominal Aortic Aneurysm Sac Enlargement After Endovascular Repair in the Greater Toronto Area - <i>Presenter: L. Figueroa-Gallaga</i></p> <p>0915-0930 EVAR stent migration and late onset Type II endoleaks - <i>Presenters: A. Berner, M. Jumah</i></p>
09h30 10h00	Refreshment Break & Exhibits <i>Pause santé et exposants - BC/AB/Yukon</i>
10h00 11h00	<p>Paper Session II: Abdominal Aortic Aneurysm - Manitoba/Saskatchewan <i>Moderators: Dr. Rafik Ghali, Dr. April Boyd</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. Describe issues related to open versus endovascular aortic aneurysm repair 2. Understand complications and factors that affect patient outcome after different types of aortic aneurysm repair <p>1000-1015 Retroperitoneal AAA Repair. A single center, single surgeon experience in 251 consecutive cases - <i>Presenter: G. Hajar</i></p> <p>1015-1030 Vascular and non-vascular Reinterventions after open AAA repair <i>Presenter: B. Cartier</i></p> <p>1030-1045 An analysis of extended length of stay of patients undergoing elective infrarenal EVAR: A local study - <i>Presenter: G. Roche-Nagle</i></p> <p>1045-1100 Institutional Experience with Short Stay EVAR - <i>Presenter: J. McDonald</i></p>
11h00 11h30	<p>CSVS Invited Guest Lecture I - Manitoba/Saskatchewan <i>Five-year update on Integrated (Direct) Vascular Training in the USA; Fad or Phenomenon?</i> Ronald L. Dalman, MD, FACS, FAHA, Chief, Division of Vascular Surgery, Stanford Hospital & Clinics</p> <p><i>Objectives – upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. Understand purpose & structure of direct vascular training in USA 2. Be familiar with advantages & limitations of direct training 3. Review outcomes of direct training residents 4. Objective differences in capability between integrated & independent residents
11h30 13h00	CSVS Annual General Meeting (CSVS members only – lunch served) - <i>Turner Valley</i> <i>Assemblée générale annuelle et déjeuner (réservé aux membres de la SCCV)</i>
11h30 13h00	Lunch – Foyer
11h30 13h00	Invited Guest Speaker & Residents/Fellows/Students meet and greet - Interesting Cases and Questions <i>Manitoba/Saskatchewan</i>

<p>13h00 14h15</p>	<p>Paper Session III: Vascular Education and Basic Research - Manitoba/Saskatchewan <i>Moderators: Dr. Tom Forbes, Dr. Don McCarville</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. Describe use of technology to improve patient understanding of vascular procedures 2. Understand advances in Surgical Education of Vascular Trainees 3. Understand the basic science research behind stent graft design 4. Understand how basic science research is used to understand various vascular conditions <p>1300-1315 Assessing 'Uncertainty' in Vascular Trainees in a Seminar Setting: Use of a 'Script Concordance' Model - <i>Presenter: E. Wooster</i></p> <p>1315-1330 Using an iPad Multimedia Presentation to Improve Patient Understanding and Satisfaction with informed consent for minimally invasive vascular procedures: a Pilot Study <i>Presenter: N. Bowers</i></p> <p>1330-1345 The Effects of Pulsatile Fatigue on <i>in situ</i> Antegrade Fenestrated Endovascular Stent Grafts Deployed inside a Semi-Realistic Phantom of an Abdominal Aortic Aneurysm - <i>Presenter: A. Ruthfauff</i></p> <p>1345-1400 Complement Deficiency Attenuates Gastro-intestinal ischemia reperfusion injury in mouse model of ruptured AAA - <i>Presenter: W.S. Johnson</i></p> <p>1400-1415 Elevated A1c is a predictor of Poor outcome following Vascular Surgery <i>Presenter: A.B. Hill</i></p>
<p>14h15 14h35</p>	<p>Advancing Vascular Skills - Manitoba/Saskatchewan <i>Moderator: Dr. Jason Bayne</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. Describe issues related to endovascular interventions in peripheral arterial disease 2. Understand complications and pitfalls associated with endovascular intervention of total arterial occlusion <p>Video Presentation : How to cross a difficult CTO without breaking the Bank? Tips & Tricks <i>Presenter: Dr. Andrew Dueck</i></p>
<p>14h35 15h00</p>	<p>Refreshment Break & Exhibits Pause santé et exposants - BC/AB/Yukon</p>
<p>15h00 16h00</p>	<p>VSEP Jeopardy - Manitoba/Saskatchewan <i>Moderator: Dr. Kent Mackenzie</i></p> <p><i>Objective: Upon completion of this session, participants will be able to elucidate their strengths and weaknesses in knowledge of a variety of vascular topics.</i></p>
<p>16h00 16h30</p>	<p>Rapid 3 minute Poster Presentations: A brief Introduction - Manitoba/Saskatchewan <i>Moderator: Dr. Greg Browne/Dr. Jim Dooner</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. Describe issues related to and affecting Vascular Surgery 2. Understand advances in various topics in Vascular Surgery

	<p>Accuracy of Centerline of Flow Measurements for Sizing Endovascular Grafts and Centerline Angles that are predictive for Inadequate Sizing <i>Presenter: K. Lee</i></p> <p>Application of Enhanced Recovery After Surgery (ERAS) in Canadian Vascular Surgery <i>Presenter: M.C. Rockley</i></p> <p>Early vs. Late Enteral Nutrition and associated Clinical Outcomes in Critically ill Patients after Thoracic and Abdominal Aortic Surgery <i>Presenter: A. Ho</i></p> <p>Endovascular Aortic Aneurysm Repair Surgical Waste Audit <i>Presenter: N. Bowers</i></p> <p>Have Guidelines Altered Vascular Ultrasound Practice? <i>Presenter: D. Wooster</i></p> <p>Initial Experiences with a Novel International Vascular Surgery Trainee Exchange Program <i>Presenter: J. Harlock</i></p> <p>Patterns of prescribing Vascular risk-modifiers among Australian, Canadian, New Zealander, and South African Vascular Surgeons <i>Presenter: A. Kayssi</i></p> <p>Perceptions of Current and previous Vascular Surgery Residents regarding Future Job Opportunities <i>Presenter: J.A. Cooper</i></p> <p>Retrospective and Prospective Review of Abdominal EVAR cases at Sunnybrook Health Sciences Centre <i>Presenter: K. Maggisano</i></p> <p>Same Day discharge following Percutaneous Endovascular Aneurysm Repair (PEVAR) – a single center experience and related outcomes <i>Presenter: I. Vucemilo</i></p>
16h30 18h00	CSVS Poster Session - Foyer <i>Wine & Cheese amongst the posters</i>
Saturday, September 14 samedi le 14 septembre 2013	
07h00	CSVS Registration Desk Opens - Top escalator <i>Ouverture du bureau d'inscription de la SCCV</i>
07h00 07h45	Continental Breakfast Petit Déjeuner - Foyer
07h45 08h15	<p>Presentation of 2013 Award Winners - Manitoba/Saskatchewan</p> <ul style="list-style-type: none"> • Cook Research Award (presented by Dr. Tom Forbes) • Gore Research Award (presented by Dr. Tom Forbes) • John L. Provan Education Award (presented by Dr. Kent MacKenzie) <p>2012 Cook, Gore and Provan Awards – project updates - Manitoba/Saskatchewan</p>
08h15 09h45	<p>Paper Session IV: Peripheral Vascular Disease - Manitoba/Saskatchewan <i>Moderators: Dr. Jacques Tittley, Dr. Keith Baxter</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. Describe issues related to management and treatment of peripheral arterial disease 2. Understand management of arterial disease in the Pediatric population

	<p>3. <i>Understand role of Hyperhomocysteinemia in Buerger’s Disease</i></p> <p>0815-0830 Angioplasty or primary Stenting for infrapopliteal arterial occlusive disease: Meta analysis <i>Presenter: M. Qadura</i></p> <p>0830-0845 Diminishing Returns: The Relationship between Repeated attempts at Revascularization and Major amputation, a single centre experience <i>Presenter: M. Guirgis</i></p> <p>0845-0900 A Population Based Description of the indications for Lower Limb Amputation and associated Outcomes across Canada <i>Presenter: A. Kayssi</i></p> <p>0900-0915 The <u>P</u>edometer and <u>W</u>alking <u>S</u>tudy (PaWS): a Pilot Project <i>Presenter: G. Roche-Nagle</i></p> <p>0915-0930 Management of Acute Limb Ischemia in the Pediatric Population <i>Presenter: A. Kayssi</i></p> <p>0930-0945 The Role of Folic Acid on Hyperhomocysteinemia in Buerger’s Disease <i>Presenter: H. Masoudpour</i></p>
<p>09h45 10h15</p>	<p>Refreshment Break & Exhibits <i>Pause santé et exposants - BC/AB/Yukon</i></p>
<p>10h15 11h15</p>	<p>Paper Session V: Venous Disease & Dialysis Access - <i>Manitoba/Saskatchewan</i> <i>Moderators: Dr. Benjamin Heisler, Dr. Thomas Lindsay</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. <i>Describe issues related to treatment and management of Venous disease</i> 2. <i>Understand differences in staging of Brachiobasilic fistula creation</i> <p>1015-1030 Outcomes After Endovenous Ablation for Treatment of Varicose Veins: A Single Center Experience <i>Presenter: A. Kayssi</i></p> <p>1030-1045 Vascular Surgeon’s Management of Venous Disease in Canada: Preliminary Data <i>Presenter: D. Wooster</i></p> <p>1045-1100 Pharmacologic Management of Venous Disease <i>Presenter: D. Wooster</i></p> <p>11:00-11:15 One-stage compared to Two-stage Brachiobasilic fistula creation for Hemodialysis access: Results of a large retrospective cohort study <i>Presenter: J. Faulds</i></p>
<p>11h15 11h45</p>	<p>CSVS Invited Guest Lecture II - <i>Manitoba/Saskatchewan</i> Quality and Value in Cardiovascular Care – The Stanford Experience Ronald L. Dalman, MD, FACS, FAHA, Chief, Division of Vascular Surgery, Stanford Hospital & Clinics</p> <p><i>Objectives – upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. <i>Consider the challenges inherent in the transition to value based health care financing</i> 2. <i>Describe benefits of nationwide registry participation</i> 3. <i>Understand structure and impact of NSQIP, UHC</i>

<p>11h45 12h15</p>	<p>Presidential Address - Dr. Gerrit Winkelaar - <i>Manitoba/Saskatchewan</i> <i>Introduction by Dr. Jacques Titley</i></p>
<p>12h15 13h30</p>	<p>Lunch - <i>Foyer</i></p>
<p>13h30 14h30</p>	<p>The Great Debates - <i>Manitoba/Saskatchewan</i> <i>Moderators: Dr. Harold Chyczij, Dr. Jerry Chen</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. <i>Understand the natural history of endovascular failure in Claudicants</i> 2. <i>Recognize implications of advances in endograft technology in the treatment of Peripheral Arterial Disease</i> <p>Debate I: Endovascular Failure in Claudicants alters the natural history of disease progression and leads to earlier conversion to CLI and Limb Loss For: Dr. Gregory Harding Against: Dr. Marie-France Guimond</p> <p>Debate II: The New Game Changer in Endovascular Treatment for PAD. Covered Stents are better than Drug Eluting Stents/Balloons and should be first line treatment for Femoral Popliteal lesions For: Dr. Joel Gagnon Against: Dr. Min Lee</p>
<p>14h30 15h00</p>	<p>Frontiers in Vascular Medicine - <i>Manitoba/Saskatchewan</i> <i>Moderators: Dr. Heather Cox</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. <i>Understand complications of Direct Oral Anticoagulants</i> 2. <i>Understand how to manage these complications in Vascular Surgery patients</i> <p>Management of Complications Related to Direct Oral Anticoagulant Therapy <i>Presenter: Dr. Artur Szkotak, Assistant Professor, Division of Hematopathology, Dept of Laboratory Medicine and Pathology, University of Alberta Laboratory Services, Alberta Health Services</i></p>
<p>15h00 15h30</p>	<p>Refreshment Break & Exhibits <i>Pause santé et exposants</i> - <i>BC/AB/Yukon</i></p>
<p>15h30 16h30</p>	<p>Paper Session VI: General Vascular Topics - <i>Manitoba/Saskatchewan</i> <i>Moderators: Dr. Mark Nutley, Dr. Jerry Chen</i></p> <p><i>Objectives: Upon completion of this session, attendees will be able to:</i></p> <ol style="list-style-type: none"> 1. <i>Describe management options of a variety of vascular pathology</i> 2. <i>Understand prevalence and treatment of Carotid Body tumours in a high altitude environment</i>

	<p>1530-1545 Comparison of Cerebral Oximetry and Transcranial Doppler In Decision to Shunt for Carotid Endarterectomy <i>Presenter: C. Dooner</i></p> <p>1545-1600 Relationship between popliteal artery aneurysm size and symptomatic status <i>Presenter: S.V.B.Patel</i></p> <p>1600-1615 Visceral Artery Aneurysm/Pseudoaneurysm Management: Comparison of Endovascular and Surgical Treatments -<i>Presenter: S. Galante</i></p> <p>1615-1630 Prevalence of Carotid Body Tumours in a Vascular Laboratory in Bogota, Colombia <i>Presenter: A. Munoz</i></p>
16h30	Meeting Adjournment
16h30 18h00	Exhibits Dismantling - BC/AB/Yukon
18h30	<p>CSVS 2013 Annual Dinner*</p> <p>Telus World of Science – BODY WORLDS & The Cycle of Life 11211 142 Street NW, Edmonton, AB</p> <p>Cocktail 18:30 Dinner 20:00</p> <p>Presentation of the 2013 Sigvaris President’s Award and Josephus C. Luke Award <i>Presenters: Dr. Gerrit Winkelaar and Dr. Karim Alibhai</i></p> <p><i>*Advance registration and dinner ticket required.</i></p>

CSVS AWARDS

The Sigvaris President's Award

Guidelines: The President's Award recognizes the most outstanding abstract dealing with venous disease presented at the Annual Meeting. Submissions for this award are sought through the annual Call for Abstract Submissions. Submissions are submitted to the CSVS Office and review, prioritization and ratification of the candidates will be made by the CSVS Academic Program Chair. The winner is announced at the Annual Meeting and a cheque in the amount of \$1,500.00 is forwarded to the winner following the Meeting.

Josephus C. Luke Award

Guidelines: The Luke Award will be presented to the best clinical or basic research paper presented at the annual meeting. The originality, science and quality of the presentation will be considered in reaching a decision. A Committee consisting of the visiting Canadian Society for Vascular Surgery Lecturer, the President of the Society who will be Chairman of the Committee and the Chairman of the Program Committee will make the decision. The monetary reward is \$500.00. The recipient will acknowledge receipt of this award in any relevant publication.

John L. Provan Education Award

Guidelines: The John L. Provan Award will be presented to any member of the Canadian Society for Vascular Surgery for any deserving project pertaining to medical education. This award is determined by the Education Committee. The monetary value of this award is \$5,000. Submissions should be sent to the Chairman of the Education Committee. The Education Committee members recommend to the Board of Directors who will decide on the recipient of this award. The recipient will acknowledge receipt of this award in any relevant publication. The successful recipient will be invited to present the results of their research at the Research Forum of the Annual Meeting.

Gore Research Award

Guidelines: The Gore Award will be presented to any member of the Canadian Society for Vascular Surgery for any deserving project in clinical or basic science research. This award is determined by the Research Committee. Submissions should be sent to the Chairman of the Research Committee. The monetary value of this award is \$5,000.00. The Research Committee members recommend to the Board of Directors who will decide on the recipient of this award. The recipient will acknowledge receipt of this award in any relevant publication. The successful recipient will be invited to present the results of their research at the Research Forum of the Annual Meeting.

Cook Award for Endovascular Therapy Research

Guidelines: The Cook Award will be presented to any member of the Canadian Society for Vascular Surgery for any deserving project in clinical or basic science research pertaining to Endovascular Surgical therapeutic strategies. This award is determined by the Research Committee. The monetary value of this award is \$5,000.00. Submissions should be sent to the Chairman of the Research Committee. The Research Committee members recommend to the Board of Directors who will decide on the recipient of this award. The recipient will acknowledge receipt of this award in any relevant publication. The successful candidate will be invited to present the results of their research at the Research Forum of the Annual Meeting.

National Student Research Award

Guidelines: The Canadian Society for Vascular Surgery (CSVS) is committed to encouraging medical student research and interest in vascular surgery. The CSVS has established a Vascular Surgery National Student Research Award to support medical students engaging in any area of vascular research under the supervision of a CSVS member. A maximum of four awards of \$2,000.00 each are available. The Education Committee of the CSVS will be responsible for selection of recipients. It is expected that the research will be conducted either over the summer or longitudinally over one year (maximum). The supervisor must be a CSVS member who agrees to provide the necessary supervision of the student from study design to submission of a final report. A final report is to be jointly submitted by the supervisor and the student upon completion of the project.

Canadian Society for Vascular Surgery 2013 Annual Scientific Meeting Edmonton AB

ABSTRACTS

Friday, September 13th, 2013
Paper Session I: Aortic Intervention

The Predictive Role of Negative Initial Imaging for the Development of an Endoleak after Infrarenal Endovascular Aortic Aneurysm Repair

*Ladowski S, Gill HL, Mackenzie KS, Corriveau MM, Abraham CZ, Obrand DI, Steinmetz OK
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Objectives: The risk of endoleak after infrarenal endovascular aortic aneurysm repair (EVAR) is significant and thus patients require lifelong imaging surveillance. This comes with risks associated with radiation exposure and contrast dye use as well as increased costs. We sought to determine the predictive value of a negative first post-operative imaging study on the long-term risk of developing an endoleak in a varied tertiary care vascular practice. We sought to determine if there are characteristics that might lend a subgroup of patients to be able to follow less rigorous imaging protocols.

Methods: Retrospective review of prospectively collected institutional outcomes data (2004-2009) including stratification according to post-operative imaging results into two groups, 1) normal first postoperative CTA, 2) endoleak on first postoperative CTA. Baseline characteristics and aneurysm morphology were compared between the two groups. Multivariate models were used to identify risk factors for development of endoleak and to assess the predictive value of a negative first post-operative imaging test.

Results: 134 were included in the analysis. Patients were treated with a mixture of Aorfix(n=2), Endurant (n=23), Talent(n=86), and Zenith (n=23) stent grafts. The median follow up time was 2.51 years (Interquartile range 1.2y-4.09y). During this period a total of 33 patients were found to have an endoleak and a total of 12 patients underwent secondary interventions for those leaks. On first post-operative CTA (mean 28 days after intervention), 27 patients (20%) had an endoleak while 107 did not. Those patients with a normal first post-operative scan were significantly less likely to go on to develop an endoleak (5.6% vs 22.2% p0.007), to require a secondary intervention for treatment of an endoleak (4.7% vs 25.9% p0.001) and to go on to develop aneurysm expansion (7.5% vs 22.2% p0.025).

Conclusion: This data suggests that some patients post EVAR whose first postoperative CT is normal may be candidates for less rigorous postoperative screening protocols. Further evaluation of patient and aneurysm characteristics would be needed before safely applying such a protocol in clinical practice.

Transesophageal Echocardiogram and use of Contrast during Proximal Aortic Endograft Placement: a Comparison of Contrast TEE with Completion Aortogram and Postoperative CT Angiography

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Background: Thoracic endovascular aortic repair (TEVAR) has become a widespread method of aortic repair with distinct advantages over open repair in the elective and emergency setting. The primary technical consideration is achievement of endoseal, which is limited by aortic arch curvature and branch vessel anatomy.

Objective: To evaluate whether the use of TEE with ultrasound contrast as an intraoperative adjunct to arteriography may achieve greater overall sensitivity for endoleak while limiting the use of IV contrast.

Methods: In this retrospective review, we compared TEE with color-flow Doppler and contrast to the current imaging standards, completion aortography and postoperative CT angiogram.

Results: There were 39 TEVAR cases in which TEE with contrast was used for intraoperative assessment. Two of these were emergent (rupture) TEVARs. Other indications included Type B aortic dissection after failure of medical management (5); Stage 2 TEVAR for Type A dissection (1); thoracic aortic aneurysm (20); penetrating aortic ulcer (7); symptomatic aortic pseudoaneurysm (3); and Kommerell diverticulum in a right-sided aortic arch (1). TEE was used to rule out endoleak in all cases and contributed as well to the following 52 intraoperative decisions: guiding wire into the true lumen of a type B dissection (5); guiding proximal deployment of a stent (15); identifying endoleak, guiding balloon deployment and confirming resolution of endoleak (16, including 4 leaks not seen on intraoperative angiography); confirming branch patency (11); placing another stent (2); and opting for no further interventions (2). There were no instances of endoleak seen only on intraoperative angiography (i.e. no endoleaks missed by TEE with ultrasound contrast) in this series.

Conclusion: Review of all thoracic endovascular aortic repair (TEVAR) cases done by the Division of Vascular Surgery, Calgary, Alberta, Canada from 2004-2012 demonstrates that TEE with contrast aids in intraoperative decision-making, including detection of endoleak and branch patency.

Surgeon Efficiency is the Most Important Predictor of Fluoroscopy Duration: Anatomic and Procedural Determinates of Fluoroscopy Time during Elective EVAR.

*R. Ruz, L Dubois, K Lee, AH Power, JR Harris, G DeRose, TL Forbes
(Division of Vascular Surgery, Western University, London, ON)*

Objectives: To identify both the procedural and anatomic factors which determine duration of fluoroscopy during endovascular aortic aneurysm repair (EVAR).

Methods: We retrospectively analyzed our prospectively maintained EVAR database for the relationship between fluoroscopy time and both procedural (type of graft, configuration, number of components, surgeon) and anatomic factors reflective of aneurysm complexity (17 variables derived from the validated St George's protocol). Linear regression was used to identify significant predictors of fluoroscopy time.

Results: 128 patients underwent elective EVAR between October 2011 and February 2012 with a mean fluoroscopy time of 5.7 ± 3.4 mins. The type of grafts used consisted of 41 (32%) Zenith (Cook) and 85 (66%) Endurant (Medtronic), with 105 (82%) being bifurcated and 23 (18%) being aorto-uni-iliac (AUI) in configuration. The mean number of components used was 2.6, with 4 surgeons performing the procedures. Both the surgeon performing the procedure ($p = 0.001$) and graft configuration (bifurcated vs AUI, $p = 0.03$) were found to be predictive of fluoroscopy time; while number of components inserted, type of graft, and anatomic variables (lengths, diameters, tortuosity, calcification, etc.) had no effect on fluoroscopy duration. Mean surgeon fluoroscopy time ranged from 4.5 ± 1.8 to 7.5 ± 5.1 mins;

while mean fluoroscopy time was lower for aorto-uni-iliac vs bifurcated devices (4.5 ± 2.6 vs 5.9 ± 3.5 mins).

Conclusions: The surgeon's efficiency in the use of fluoroscopy during EVAR is the most important determinant of total fluoroscopy time. Anatomic complexity, make of device, and number of components inserted have minimal impact on duration of fluoroscopy. An endovascular surgeon's ability to curtail fluoroscopy duration is the key component in minimizing radiation exposure to both the surgical team and the patient. Given its strong association with the individual surgeon, fluoroscopy time may evolve as a quality measure for those performing EVAR.

Iliac Branch Device Procedures: Does Anatomy Matter?

D Jiang MD(c), J Gagnon MD, J Chen MD

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Objective: To review the iliac branch device (IBD) procedures performed at Vancouver General Hospital and to evaluate their outcomes.

Methods: A retrospective review was conducted of patients who underwent Endovascular Aneurysm Repairs (EVARs) incorporating IBDs from May 2008 to February 2012. Data on patient demographics, comorbidities, anatomical details, postoperative events and follow-up findings were gathered by reviewing hospital charts, clinic charts as well as peri-operative and postoperative imaging.

Results: A total of 23 procedures were reviewed. One patient received bilateral IBDs procedures, which were counted separately. Follow-up length ranged from 1 to 39 months (Median = 12). Average patient age was 78.9 years. Twelve procedures were done in accordance to IFU (IFU group); 6 procedures had extension of the branch graft into the posterior branch of the internal iliac artery (POST); 5 procedures had smaller than recommended (<16mm) distal common iliac artery diameter (SmCI). The overall technical success rate was 95.7%. One patient in the SmCI group had intra-operative failure of the IBD requiring an open external iliac artery (EIA) to IIA bypass. Overall branch patency rates at 1 year and 2 years were 85.9% and 73.7% respectively. On follow-up, there was 1 IIA occlusion in the IFU group (8.3%), 3 in the POST group (50%) and 1 in the SmCI group (20%). There were 5 flow-limiting EIA stenoses requiring endovascular intervention (21.7%). There were 2 Type IB endoleaks present on follow-up CTAs. One Type III endoleak proximal to the IBD caused aortic aneurysm rupture requiring urgent endovascular repair. Our overall re-intervention rate was 34.8% (8/23). Fourteen percent (3/22) of patients had ipsilateral claudication at the last follow-up.

Conclusion: Our IBD experience yielded suboptimal results with a higher than expected re-intervention rate. Non-adherence to IFU appears to have a negative impact.

Predictors of Abdominal Aortic Aneurysm Sac Enlargement after Endovascular Repair in the Greater Toronto Area

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Objective: To evaluate compliance with instructions for use and sac enlargement rate after endovascular abdominal aortic aneurysm repair (EVAR).

Methods: All patients that underwent EVAR with a pre-op CTA as well as a post-op follow-up with either CTA or ultrasound (US) will be enrolled in this observational study. Demographic data will be obtained. Preoperative aortoiliac characteristics are assessed using Vitrea FX AAA worksheet (Toshiba Vital v 6.3) and the latest follow up measurements as reported in the CTA or US. Secondary interventions are also assessed and reported.

Results: The data presented in this abstract is partial including patients from one of the sites, Toronto General Hospital, (2010-2011) further data collection is commencing at the other sites.

A total of 143 patients have been analyzed of which 118 (82%) were male. Elective aneurysm repair was performed in 106 (74%) cases, urgent in 37 patients (26%) of which 15 (10%) were symptomatic AAA and 22 (15%) ruptured AAA. Cook devices were used in 114 cases (80%), Medtronic in 25 (17%) and Anaconda in 4 (3%). Mean maximum sac diameter is 59mm (50-90.5) and sac volume of 153cc (60.5 - 347). The mean aortic neck length was 25mm (5.5-58), mean diameter measures 23mm (19-33.5) and mean angulation of 35 degrees (9-65.2). After EVAR the mean sac enlargement was -5.7mm (-14.3 to +6.7) with AAA maximum sac diameter of 51.3mm (36-72). The endoleak rate was 4.4% with 5 type I, 26 type II and one type V, with no type III or IV endoleaks. After secondary interventions all type I endoleaks were successfully treated.

Conclusion: To date we have demonstrated better compliance with published IFU's in comparison to previously published data^[5]. Further analysis will determine if this is associated with better outcomes.

^[5] Schanzer, et. al. "Predictors of Abdominal Aortic Aneurysm Sac Enlargement After Endovascular Repair" *Circulation* 2011;123:2848-2855.

EVAR stent migration and late onset Type II endoleaks

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Background: Stent migration following endovascular aneurysm repair (EVAR) is related to complications including endoleak. Society for Vascular Surgery (SVS) standards define migration as >10mm, but data regarding incidence of migration, and its relationship to endoleak is sparse. The aim of this study was to investigate migration of EVAR stents post-procedure and correlation with endoleaks.

Methods: CT Angiography of patients who underwent an EVAR at our centre between March 2006 and September 2011 were retrospectively studied. All included patients had CT angiograms <365 days post EVAR and interval follow up CT >300 days. Maximum anteroposterior (AP) diameter of aneurysm was measured on pre-EVAR CT scan. Post-EVAR and most recent CT scans were examined for proximal stent migration (defined as a change in distance from two fixed points: superior mesenteric artery (SMA) to top of bare metal stent) and for evidence of endoleak(s).

Results: 76 patients were studied. Mean proximal caudal migration was 1.55mm (95% CI = 0.70–2.40mm). 10 patients had evidence of Type II endoleaks on most recent CT. There was an increased risk of Type II endoleaks on most-recent CT scan with caudal migration of the stent (Odds Ratio 1.60, (95% CI

8.35-0.31). Average AP diameter of aneurysm was slightly higher for patients with an endoleak on most recent CT scan compared to those without (62.85mm, 95% CI 62.71-63.99mm vs. 59.00mm, 95% CI 58.91-59.09mm).

Conclusions: Our study demonstrated minimal stent migration and overall late onset endoleaks are a rare event. Although there is a positive correlation between stent migration and Type II endoleaks, a larger sample population is required to validate this finding due to low incidence of endoleaks detected. No type I endoleaks were found. Patients with endoleaks have a significantly higher mean AP diameter of aneurysm, but again larger studies would be required to further investigate this correlation.

Friday, September 13th, 2013

Paper Session II: Abdominal Aortic Aneurysm

Retroperitoneal Abdominal Aortic Aneurysm Repair. A single center, single surgeon's experience in 251 consecutive cases

G. Hajjar MD, T. Brandys MD, A. Hill MD, P. Jetty MD, S. Nagpal MD

(Division of Vascular & Endovascular Surgery, The Ottawa Hospital, Civic Campus and University of Ottawa)

Purpose: Both anecdotal and objective reports exist, as to the advantages of retroperitoneal approach to repair of AAA. It is considered the approach of choice for difficult aneurysm necks or hostile abdomens. In this series we reviewed the outcome of this approach in 251 consecutive patients at a single center, with a variety of complicated anatomical features.

Method: Retrospective review of 251 consecutive patients between (2004-2012). Inclusion: all abdominal aortic aneurysm undergoing open repair. Exclusion: unstable acute ruptures with large hematoma in left lower quadrant, and patients needing concomitant right renal or mesenteric bypass.

Results: 195 males and 56 females. Mean age 71 years. Comorbidities included: CAD 112, COPD 40, diabetes 44, Obesity (BMI>30)46, smoking 230, Hypertension 165. Aneurysm characteristics: primary 246, redo 5. Electives 231, acute/symptomatic 15, ruptured 5. Aneurysm morphology: 212 infra-renal, Juxta-renal 33, suprarenal 6. Eighty nine had associated iliac aneurysms, 24 aortoiliac disease requiring an ABF graft, 6 inflammatory type, 2 horseshoe kidneys. Additional procedures: renal reimplantation or graft 6. two patients had preliminary ax- fem, excision of infected aortic graft and duodenal closure. IMA re-implantation 5. Intra-op mortality 0, 30-day mortality 2, total in-hospital mortality 4. (1.6%). Length of stay: avg 6 days. Complications: cardiac: arrhythmias 12, CHF10, MI: 8, Renal: 20 transient rise in Creatinine, 6 ARF: 2 hemofiltration only, 3 transient dialysis, 1 permanent Respiratory: exacerbation of COPD:5 and 1 PE. Post-op bleed 6. GI: Ischemic colitis: 8 transient, 4 C.diff, 2 colectomies. UGI bleeding. 6 gastro duodenal erosions, 4 postop ileus. Peripheral ischemia: 4 patients. Incisional complications: 13 patients: wound infection 6, wound haematoma 4, serosanguinous drainage 3. Late incisional complications: 1 Intercostal neuralgia, 6 specific complaints about asymmetric bulge.

Conclusion: In this series, retroperitoneal approach to repair of abdominal aortic aneurysm compares favourably to published data on open trans-abdominal repair. It is easily feasible for a variety of complicated anatomical situations, and should not be restricted to just difficult upper ends or hostile abdomens.

Vascular and non-vascular reinterventions after open AAA repair

B. Cartier, (CSSS du Suroît à Valleyfield, QC)

Introduction: The peri operative mortality of AAA repair is low with the endovascular and open approach although with a slight advantage for EVAR. However the rate of reintervention for EVAR can reach 20% with 2% mortality. But what is the rate of reintervention in open surgery? The author relates his personal experience.

Method: This is a retrospective study of abdominal aortic surgery performed by the author between 2000 to 2011. During this period 302 aortic surgeries were performed including 238 for AAA, of these 29 were for ruptured AAA and 11 for iliac aneurysms. 18 patients were excluded, because the follow-up was less than 1 month.

Results: 220 patients, 46 women (55-87 years), 174 men (47-88 years). The dimension of the AAA ranged from 4.6 and 12 cm. 1-167 months follow-up (average 30.3). Comorbidities: 78.2% with previous abdominal surgery, MCAS 23.2%, HTA 66%, Db 16.4%, hyperlipemia 53.4%, COPD 14.3%, 47% smoking, obesity 1.3%. Peri operative morbidity (over 238 patients) cardiac 29.4%, pulmonary 8%, renal 7.1%. Peri operative mortality, 7/209 for elective surgery (3.3%) and 9/29 for emergency surgery (31%). Incisional hernia at follow-up, 39/220 (17.7%); patients required treatment for hernia 18/220 (8.2%). Patients admitted for subocclusion 9/220 (4%) including 3 requiring surgery and 1 death. 12 vascular reinterventions in 9 patients (9 graft related) and 1 death. So 28 reinterventions (9 vascular, 19 non-vascular) in 26 patients (11.8%). 2/220 deaths (0.9%).

Conclusion: This study showed a low rate of non-vascular and vascular reinterventions after open AAA repair and low long term mortality related to the procedure.

An analysis of extended length of stay of patients undergoing elective infrarenal EVAR: A local study

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Objective: The division of Vascular Surgery at the University Health Network in Toronto (UHN) has been a member of the Society for Vascular Surgery's Vascular Quality Initiative (SVS-VQI) since August 2010. It was identified by SVS-VQI that our length of stay (LOS) is longer than expected for elective infra-renal EVAR when compared to VQI benchmarking data from other centres (≤ 2 days). Extended LOS is associated with an increased risk of hospital acquired morbidity and increased costs. The purpose of this retrospective study was to identify factors which contribute to extended LOS for patients undergoing standard, infrarenal EVAR procedures at UHN and establish a quality improvement framework for addressing those findings.

Methodology: Institutional REB approval was obtained. We identified EVAR cases entered between January 2011 and December 2012 and performed a detailed chart audit to capture factors that may have contributed to an extended LOS. Physician office charts and hospital electronic records were used. We included and compared patients who stayed for the expected duration and those who stayed beyond. Emergency cases, complex and thoracic EVARs were excluded. We evaluated the univariate associations between all categorical variables and longer LOS (LOS > 2 days) using the Chi-square or Fisher's exact test.

Results: One hundred and forty-four charts were identified for the time period, and 31 (21%) were excluded (ruptured or symptomatic), leaving 113 for analysis. We found that 59 patients (52%) stayed longer than 2 days. Statistically significant factors identified as being important were abnormal vital signs POD 0, cardiovascular, wound and urologic issues. There was a trend towards advanced age (> 80 years) as being important.

Conclusion: Multiple factors were identified as contributing to extended LOS. Efforts to mitigate the effects of these factors in the peri-operative setting may decrease our LOS and complication rate. Use of a centralized, benchmarking database has been informative in guiding our quality improvement efforts.

Institutional Experience with Short Stay EVAR

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Background: Endovascular Aortic Aneurysm Repair (EVAR) is a well-established treatment modality in the management of infra-renal abdominal aortic aneurysms (AAA) offering lower morbidity and mortality, as well as reduced overall hospital length-of-stay (LOS). Many of our post-op EVAR patients have a LOS of only one day, and a smaller subset of that are planned short-stay-overnight (SSO) admissions. With an increasing focus on resource management, SSO EVARs can potentially reduce overall hospital costs as well as permit a greater number of patients treated.

Objectives: The aim of this study is to assess the safety and efficacy SSO EVARs as compared to conventional non-SSO EVARs.

Methods: Retrospective review of patients who underwent EVAR for infra-renal AAA between January 2012 to February 2013 at our institution. Exclusion criteria included fenestrated, unilateral or iliac-branched-grafts, as well as EVARs for ruptured AAA. Demographics, comorbidities, length of stay (LOS), 30-day re-admission rates, complications, and mortality data were recorded. Descriptive and logistic regression was performed.

Results: Between January 2012 to February 2013, 144 EVARs met our inclusion criteria. Overall average LOS was 1.93 days with a 30-day readmit rate of 3.47% (n=5). There were 127 non-SSO EVARs with an average LOS of 2.05 days and a 30-day readmit rate of 3.14% (n=4). Of these 127 non-SSO EVARs, 65% (n=83) had a LOS of only one day and a 30-day readmit rate of 2.41% (n=2). Alternatively, there were 17 SSO EVARs (4 of which failed and required a longer hospital stay), with an average LOS of 1.06 days, a 30-day readmit rate of 5.88% (n=1). Overall there were 96 EVARs with a LOS = 1 day (83 non-SSO + 13 successful SSO), in which the 30-day readmit rate was 3.13% (n=3)

Conclusion: In select patients, one day hospital admission following EVAR can offer a safe, effective, and reduced LOS alternative to conventional EVAR hospital stays with a similar 30-day readmit rate.

Friday, September 13th, 2013
Paper Session III: Vascular Education and Basic Research

Assessing 'Uncertainty' in Vascular Trainees in a Seminar Setting: Use of a 'Script Concordance' Model
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Background: Structured seminars are a common learning setting for vascular trainees. They are usually directed by faculty, anchored in case discussion and explore trainees' knowledge of the 'right' answers. Such a learning model relies on 'activation of prior knowledge' to synthesize an approach to a 'real clinical situation'. Many practice situations are not well defined and introduce an element of 'uncertainty'. The 'script concordance model' (SCM) allows for learning in context with development of 'rich knowledge structures'.

Objectives: The aims of this study were to 1. Address the potential use of SCM in a seminar setting, 2. Determine if trainees could engage with the 'uncertainty' presented, 3. Identify if such engagement resulted in deeper understanding of the material.

Methods: Trainees were presented with similar clinical topics in the setting of a traditional seminar with structured discussion and a seminar presented in an 'uncertainty' format with SCM questions. The trainees attitudes to each format were noted by objective (discussion time, depth of enquiry and additional questions) and subjective (interest, attention, intent to learn) metrics.

Results: Trainees attended 2 seminars in each format. Discussion time (22 vs 15 min), depth of enquiry (3+ vs 1+) and additional questions (12 vs 4) showed greater engagement with the SCM approach. Subjective measures favoured the SCM also.

Conclusion: The SCM approach to explore 'uncertainty' in the seminar setting showed positive outcomes in a variety of spheres. The study is limited by small numbers. Further study to identify learning benefits, retention of learning and application of learning in clinical situations is required.

Using an iPad Multimedia Presentation to Improve Patient Understanding and Satisfaction with Informed Consent for Minimally Invasive Vascular Procedures: a Pilot Study

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(¹Faculty of Medicine, University of Toronto, ²Division of Vascular Surgery, UHN, ³Division of Vascular/Interventional Radiology, UHN)*

Objective: Vascular interventions are becoming increasingly complex. As procedures become more complex, patient understanding of their treatments can become more difficult. This study aims to evaluate the utility of multimedia presentations (MMP) on an iPad computer for patient understanding of vascular interventions.

Methods: Patients undergoing EVAR, peripheral angioplasty, Hickman catheter and PICC insertion were randomized into a control group receiving traditional verbal consent, and a MMP group that were shown a 2 minute simplified video of their procedure on an iPad computer in addition to the traditional verbal consent. After obtaining consent, and prior to the procedure, all patients completed a

questionnaire assessing their comprehension of the procedure, and satisfaction with the consent process.

Results: Ninety-three patients were recruited for this study. Patients in the MMP group reported the utility of the MMP as an average of 4.8 on a 5 point Likert scale, with 5 being 'very helpful' in understanding the procedure. The MMP was shown to improve patient comprehension of EVAR and angioplasty procedures, with EVAR patients in the MMP group answering more questions correctly ($p=0.04$), and angioplasty patients in the MMP group answering more questions correctly ($p=0.002$), than the verbal consent control groups during assessment of comprehension.

Conclusion: This study has shown that patients find the use of MMP during the consent process to be very helpful in understanding vascular interventions, and that patients receiving certain vascular interventions have improved comprehension of their procedures when shown a MMP during the consent process. Given the rapid rate of innovation in vascular surgery, the use of MMP to help patients understand new and complex procedures would be beneficial in the future care of patients undergoing vascular interventions.

The Effects of Pulsatile Fatigue on *in situ* Antegrade Fenestrated Endovascular Stent Grafts Deployed inside a Semi-Realistic Phantom of an Abdominal Aortic Aneurysm

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Objective: To observe the performance of conventional stent grafts after being fenestrated using RF puncture and a conventional angioplasty balloon or a cutting balloon, followed by pulsatile fatigue for 40 million cycles.

Methods: Two Cook Zenith® and two Medtronic Endurant® devices were deployed supra-renally into polyurethane phantoms of an abdominal aortic aneurysm so that the renal arteries were covered. They were then fenestrated under fluoroscopy at the renal arteries using a radiofrequency puncture device and dilated using two different types of balloon catheters, a conventional angioplasty balloon for one of each type of device and a cutting balloon for the remaining two devices. Atrium® stent grafts were deployed through the fenestrations. They were then fatigued on a pulsatile fatigue tester for 40 million cycles or the equivalent of one year *in vivo*. The devices were then examined for evidence of loss of integrity of the graft fabric and enlargement of the fenestrations.

Results: A significant waist was observed on the Atrium® extensions when a conventional angioplasty balloon was used. All devices showed signs of melted and fused fibers at the edge of the fenestration. After fatigue testing the extent of fraying was greater with use of a cutting balloon. None of the fenestration sizes or dimensions increased after fatiguing. As expected, the burst resistance of the fenestrated areas decreased, reflecting the relative size of the fenestration. After fatiguing, the radial stiffness increased for both Cook devices, and decreased for both Medtronic devices.

Conclusions: There were changes in the structure due to both fenestration and fatigue but they did not impact the overall integrity of the devices. The type and extent of change were dependent on the

material selection, fabric structure, and the fenestration technique. There was no enlargement of the fenestrations after fatiguing.

Complement Deficiency Attenuates Gastro-Intestinal Ischemia Reperfusion Injury in a Mouse Model of Ruptured Abdominal Aortic Aneurysm.

WS Johnson, TF Lindsay (Division of Vascular Surgery, University Health Network and Department of Surgery, University of Toronto)

Objective: To examine the role of complement immune system activation in Ischemia-Reperfusion (I/R) injury after Ruptured Abdominal Aortic Aneurysm (RAAA) using a complement deficient knockout mouse model.

Methods: Wild type and complement deficient knockout mice were used to model the sequential I/R injuries of hemorrhagic shock and supramesenteric aortic clamping of RAAA repair. We employed complement deficient mice that were unable to activate the complement immune system by one of the 3 known initiation streams: Mannan-Binding Lectin (MBL K/O), classical (C1q K/O), or alternative (Factor B K/O) pathways. Gut and lung injury were quantified as the degree of I¹²⁵-labelled albumin leak. Neutrophil sequestration into the gut and lung were measured via levels of myeloperoxidase (MPO).

Results:

	Sham	Wild Type	MBL K/O	C1q K/O	Factor B K/O
Gut Permeability (units/uL serum I ¹²⁵ activity/90 min of reperfusion)	1.64 +/- 0.53	6.61 +/- 1.75*	3.32 +/- 0.69	1.92 +/- 0.21	2.84 +/- 0.35
Gut Neutrophil Sequestration (MPO/mg gut protein)	0.20 +/- 0.05	0.38 +/- 0.04*	0.27 +/- 0.06	0.05 +/- 0.01	0.07 +/- 0.01

presented as means +/- SEM, * indicates P<.05 vs. Sham

Conclusions: This model simulates the sequential I/R injuries associated with open repair of RAAA. It results in significant local reperfusion gut injury, perhaps mediated via neutrophil sequestration. Interference with complement immune system activation by targeted knockout of complement initiation significantly attenuates gastro-intestinal I/R injury, and reduces neutrophil sequestration in both the gut and lung. Complement plays a significant role in the initiation of ischemia-reperfusion injury in this mouse model of RAAA, which suggests the complement pathway as a future target for investigation into the mechanisms of organ dysfunction after RAAA repair.

Elevated A1c is a Predictor of Poor Outcome Following Vascular Surgery

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Purpose: Diabetes is present in 30-40% of patients presenting for vascular surgery. Diabetes and hyperglycemia have been implicated as risk factors for perioperative complications in other study populations; however, there is limited data concerning the role of glycemic control in the vascular population.

Methods: A1c, a marker of glycemic control in diabetics, was measured prior to surgery in 520 consecutive patients undergoing vascular surgery between August 2009 and December 2010. The patients were evaluated for demographic data, glucose levels and perioperative complications.

Results: 60% of the 169 patients with diabetics had elevated A1c (>0.065) prior to surgery. Patients with A1c levels > 0.065 had increased risk of stroke or a coronary event following surgery and the risk appears to be related to the degree of preoperative hyperglycemia (A1c >0.065 relative risk (RR) = 2.4 $p=0.03$, A1c >0.75 RR=3.2 $p=0.01$, A1c > 0.08 RR=4.2 $p<0.01$). The effect of elevated A1c on stroke or coronary events was independent of other risk factors ($p=0.03$, logistic regression analysis). Complication free surgery was predicted by normal A1c levels while A1c > 0.08 predicted morbidity and mortality following vascular surgery (RR=1.5, $p=0.04$). The development of complications was associated with increased length of hospital stay: mean 31.2 days (25.3-36.9 95% CI) vs. 7.3 (6.5-8.2 95% CI) for uncomplicated surgery patients.

Conclusion: A significant proportion of diabetics present for vascular surgery with poorly controlled glucose. Elevated preoperative A1c and hyperglycemia predicts poor outcome for patients undergoing vascular surgery. Strategies to identify and manage hyperglycemia may provide an opportunity to improve patient outcome following vascular surgery.

CSVS Poster Session Friday, September 13, 2013

Accuracy of Centerline of Flow Measurements for Sizing Endovascular Grafts and Centerline Angles that are Predictive for Inadequate Sizing

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Objectives: To determine the accuracy of centerline of flow measurements for sizing endovascular grafts. Centerline angles, as a measure of aortoiliac tortuosity, were explored for their predictive value of inadequate pre-operative sizing.

Methods: Fifty consecutive patients treated by endovascular aneurysm repair in 2012 were retrospectively analyzed using TeraRecon centerline software.

Results: Fifty patients underwent 9 aorto-uni-iliac and 41 aorto-bi-iliac repairs using 36 Medtronic Endurant, 12 Cook Zenith, and 2 Vascutek Anaconda stent grafts. A total of 91 pre and post-operative lengths from lowest renal artery to internal iliac artery were obtained. As well, pre-operative infrarenal, aorto-iliac, and common iliac centerline angles were determined. Overall, there was no significant difference between the pre and postoperative lengths ($p=0.37$, mean difference 3 mm). However, 12 post-operative lengths (13%) were at least 5% (or 10 mm) shorter than their respective pre-operative lengths. All of these had aorto-iliac ($n=5$) or common iliac ($n=8$) centerline angles greater than 90 degrees. Only one centerline had a common iliac angle greater than 90 degrees and no significant change in pre and post-operative length measurements. There were no infrarenal centerline angles greater than 90 degrees.

Conclusion: Length calculations based on centerline measurements provided accurate lengths for sizing endovascular grafts in the majority of cases. However, pre-operative aorto-iliac or common iliac

centerline angles greater than 90 degrees were associated with shorter post-operative lengths, suggesting that placement of shorter grafts should be anticipated.

Application of Enhanced Recovery After Surgery (ERAS) in Canadian Vascular Surgery

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Objective: To understand the current state of perioperative care in Canadian vascular surgery; investigate the barriers to integrating ERAS perioperative concepts into Canadian vascular surgery; and assist surgeons in optimizing their perioperative management.

Methods: An online survey concerning the aspects of perioperative management addressed by ERAS was sent to all CSVS members. Participants will receive a comparison of their center with both the national standard and published evidence.

Results: Early results have yielded a 16% response rate, and we are awaiting further results before final analysis. Current respondents reported postoperative management which reflects ERAS in the following areas: avoidance of bowel preparation (95%), early mobilization (95%), routine epidural analgesia (95%), routine avoidance of abdominal drainage (86%), and routine postoperative anti-emetics (52%).

Respondents reported postoperative management which does not reflect ERAS in the following areas: preoperative fasting timeline (5%), postoperative chewing gum (11%), early removal of Foley catheters despite epidural analgesia (29%), and avoidance of postoperative nasogastric decompression (33%).

There are multiple reasons why practice may not resemble current evidence. Of the respondents who use postoperative nasogastric decompression, 50% are not aware of contrary evidence, while 43% do not find the contrary evidence to be adequate. 39% do not find evidence supporting postoperative chewing gum to be adequate. As well, 46% of respondents do not remove Foley catheters during epidural analgesia despite believing that it is safe, citing external barriers preventing change in their practice.

Conclusion: ERAS is a collection of evidence-based perioperative guidelines. Although developed for general surgery, perioperative similarities allow guidelines to be applied effectively in vascular surgery. Several concepts of ERAS are prevalent in Canadian vascular surgery, while others have not been incorporated. Where practice differs from ERAS, respondents cite both a lack of awareness of the literature and assertion that current literature is inadequate. To promote awareness, we will provide literature summaries to respondents including vascular specific trials, and further disseminate the literature nationally. Where evidence is inadequate, we plan to perform RCTs to clarify discrepancies.

Early versus late enteral nutrition and associated clinical outcomes in critically ill patients after thoracic and abdominal aortic surgery

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Objective: To examine the timing of initiating enteral nutrition (EN) in critically ill patients after aortic surgery in our CVICU in comparison to current Canadian practice guidelines, and to evaluate any associated morbidity and mortality.

Methods: Between January 2004 and December 2011, all patients after open and/or endovascular repair for aneurysmal or occlusive aortic disease were screened for use of EN in the CVICU. A retrospective chart review was completed on eligible patients. All critical care intensivists and vascular surgeons were surveyed on their practices regarding initiating EN in this patient population.

Results: 1011 patients were screened and 34 (5%) received post-operative EN in CVICU. Of those who received EN, only 15% received early EN (within 24-48 hours of admission). The most common reason for late initiation of EN was reinitiation of mechanical ventilation. There were no significant differences in morbidity and mortality between early and late EN groups. On subgroup analysis, patients on inotropes who received early EN had significantly lower mortality and fewer infections. 73% of critical care intensivists surveyed start early EN, while 67% of vascular surgeons wait for signs of bowel function. Despite differences in practice, 86% of physicians feel that current practice guidelines for early EN are applicable to these patients.

Conclusion: Most post-operative aortic surgery patients in our CVICU did not require EN. However, for those that did, practice guidelines were not achieved. Achieving early EN in sicker patients was associated with better outcomes. Practices between intensivists and surgeons regarding EN varied.

Endovascular Aortic Aneurysm Repair Surgical waste audit

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Background: University Health Network adopted an environmental management system in 2000 to identify opportunities to green the hospital. Operating rooms (ORs) are estimated to generate up to one-third of hospital waste. To investigate waste production associated with Endovascular Aortic Aneurysm Repairs (EVAR), we performed a surgical waste audit to gauge the environmental impact of this procedure and generate strategies to improve waste management.

Methods: We conducted a waste audit of 5 EVARs performed by the vascular department in February 2013. Waste was categorized into 6 streams: regular solid waste, recyclable plastics, recyclable paper, biohazard waste, laundered linens and sharps. Volume and weight of each stream was quantified. We used Canadian hospital discharge abstract data (2008-2009) to estimate annual weight and volume totals of waste from all EVARs performed in Canada.

Results: The average surgical waste (excluding laundered linens) per EVAR was 20.4 kg, of which 13.1 kg (64.2%) was normal solid waste, 2.62 kg (12.8%) was biohazard waste, 2.44kg (12%) was device boxes, 2.06 kg (10.1%) was recyclables and 0.18 kg (0.9%) was sharps. The average volume of waste per EVAR was 0.77 m³. Device packaging contributed considerably to total waste. We estimated that landfill waste from all 3756 EVARs performed in Canada in from 2004 to 2009 was 76662 kg by weight and 2895.5 m³ by volume.

Conclusion: Endovascular Aortic Aneurysm Repairs produce considerable amounts of surgical waste. Environmentally friendly surgical products and waste management policies may allow ORs to diminish the negative effects of waste production without compromising patient care.

Have Guidelines Altered Vascular Ultrasound Practice?

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Background: Numerous clinical practice guidelines (CPG) and testing and interpretation standards (Standards) that impact on vascular ultrasound (VU) have been recently published. Accrediting agencies (eg CPSO) and payers (MOHLTC) have called for increased applications of guidelines. Experience in practice, however, suggests that there is limited uptake of such guidelines by vascular surgeons and imaging specialists involved with VU.

Objectives: The aims of this study were to 1. identify CPG and Standards relevant to VU practice, 2. Determine the level of their incorporation into protocol manuals and 3. correlate the impact of this on interpretation reports sent to referring physicians.

Methods: An electronic literature review was performed to identify CPG and Standards; the findings were correlated with appropriate testing and description of test protocols and reporting criteria. Protocol manuals were obtained and parsed for evidence of incorporation of guidelines. Interpretation reports were subjected to a structured audit tool designed to identify guideline-driven reporting.

Results: 10 protocol manuals were reviewed; 70% indicated guidelines were used in the manual (20% consistently cited and 50% limited reference). Guidelines were cited more frequently in carotid (70%) and arterial (40%) than in venous testing (20%). In 100 interpretation reports, overall reporting standards were followed in 68%. Testing standards were followed in 68% but surveillance recommendations in only 30%. Evidence of guideline-driven reporting varied with individual test modalities (carotid 78%, arterial 42%, venous 22%).

Conclusion: Incorporation of published guidelines relevant to vascular ultrasound testing into protocol manuals remains incomplete. Interpretation reports do not reflect guideline-driven practice, particularly in venous and arterial studies. Although a larger scale study is required to identify the impact on patient care, emphasis on guideline implementation remains an important priority in quality vascular care.

Initial Experiences with a Novel International Vascular Surgery Trainee Exchange Program

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Objective: Direct entry into vascular surgery training programs has proven to be a popular and successful initiative in the United States, and has recently been instituted in Canada. Residency training programs on both sides of the border now have the mandate of ensuring their trainees are fully prepared for contemporary and independent practice in 5 years. In the United States, the graduating trainee average number of open vascular cases (GTAN) continues to decline. Moreover, integrated vascular trainees (USV) have less exposure to open abdominal surgery compared to traditional Independent trainees. Currently, Canadian vascular surgery trainees (CNV) have less emphasis on endovascular techniques than their American counterparts. Here we present a novel ACGME-approved

US-CAN exchange program aimed to improve both open vascular and endovascular training for both cohorts.

Methods: From 2010-2012, 2 Integrated vascular residents from Stanford University Medical Center (Palo Alto, California), and 2 vascular fellows from McMaster University (Hamilton, Ontario), each participated in a 3-month clinical exchange rotation. Procedure logs were compared from exchange period and with the GTAN for 2011.

Results: USV performed an average of 141 procedures during the exchange period, 91 (65%) being primary open reconstructions. This included 10 open abdominal aortic aneurysm (AAA) repairs, (vs. GTAN 12), 2 open ruptured AAA repairs (GTAN 3.4), 5 aorto-bi-femoral bypass (GTAN 9), and 11 femoral-popliteal bypass (GTAN 19). CNV trainees performed an average of 69 procedures, with 51 (74%) primary endovascular interventions.

Conclusions: This ACGME/ABS approved international surgical exchange program provides complimentary training opportunities to both institutions not available outside this framework. Focused as a concentrated elective rotation, similar exchanges may serve as a model for supplementing training in both countries.

Patterns of prescribing vascular risk-modifiers among Australian, Canadian, New Zealander, and South African vascular surgeons.

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²Western Hospital, University of Melbourne, Melbourne, Australia)

Objectives: Several guidelines have been developed to help clinicians optimize vascular risk factors such as diabetes, dyslipidemia, hypertension, and smoking. The goal of this study was to assess vascular surgeons' views on prescribing vascular risk factor medications (RFs) in four countries.

Methods: An online survey was administered to vascular surgeons in Australia (AU), Canada (CA), New Zealand (NZ) and South Africa (SA) to investigate their attitudes towards prescribing RFs and identify barriers to improving patient compliance.

Results: 91 surgeons completed the survey (32 AU, 33 CA, 7 NZ, 19 SA) with an average career span of 17 years. Most CA surgeons had an academic practice (51.5%), while >50% of other respondents had a private or mixed academic-private practice. 54.9% of respondents believed that most of their patients were on appropriate RFs. 69.2% routinely prescribed anti-platelets (89%) and statins (73.6%) but only 22% regularly monitored side-effects. While 57.9% of SA surgeons believed that surgeons should be primarily responsible for prescribing RFs, most other respondents disagreed. Most respondents believed that vascular surgeons relied on their medical colleagues to prescribe RFs (67%) and did not want to monitor side-effects (68.1%). 82.4% believed it was possible to improve patient compliance and identified barriers such as lack of patient understanding of medication benefits (74.7%), poly-pharmacy (52.7%), and side-effects (42.9%).

Conclusions: Our findings suggest that most vascular surgeons in the countries surveyed prescribe some RFs but expect primary healthcare providers and medical specialists to prescribe other RFs and monitor patient compliance and side-effects. Compliance can be improved through better patient education on

medication benefits and closer collaboration with other physicians to monitor and treat medication side-effects.

Perceptions of current and previous vascular surgery residents regarding future job opportunities

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Objectives: To determine the current employment environment for recent vascular surgery graduates and to identify factors that facilitate their job prospects. The perceptions of current trainees in regards to potential employment opportunities are also explored.

Methods: A descriptive, cross-sectional web based survey of Canadian residents currently enrolled in vascular surgery training programs, and of recent graduates (2011, 2012).

Results: Preliminary results include responses from 14 current residents and 5 recent graduates. 60% of recent graduates felt that employment opportunities were very important in their decision to pursue a career in vascular surgery, compared to only 14% of current trainees. All of the recent graduates attained employment with 80% doing so before completing their training. On average each graduate received 2.6 job offers and 100% of graduates obtained the position they wanted. In contrast, 57% of current trainees foresee it being difficult to find employment in vascular surgery, and predict that they might have to extend training due to lack of positions. Oversaturation of the job market and overproduction of trainees were the most important concerns of both graduates and trainees with regards to attaining employment.

Conclusions: There is a discrepancy between the favorable employment climate experienced by recent Canadian vascular surgery graduates and the pessimistic outlook of current trainees. Recent graduates have enjoyed multiple job offers and 100% employability; while current trainees fear the potential effects of too many trainees and an oversaturated job market. For this favorable employment climate to persist, Canadian vascular surgery must be progressive in balancing the employment opportunities with the number of graduates. Number and timing of job offers to graduates is a possible future metric of the optimum number of residents.

Retrospective and Prospective Review of Abdominal EVAR cases at Sunnybrook Health Sciences Centre

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Objective: This exercise reviewed all relevant patient and procedural information pertaining to the entire collection of patients undergoing abdominal or iliac endovascular aneurysm repair, in order to delineate the incidence of complications such as type II endoleaks or graft occlusion, and any risk factors associated with them.

Methods: A retrospective and prospective review of relevant patient information was collected on 353 abdominal or iliac aneurysm procedures requiring endovascular grafts. Discriminant analysis for continuous variables (namely, anatomical features) and stepwise binary logistic regression for nominal and categorical data with the dependent variables of limb occlusion and type II endoleak was performed.

Results: In the discriminant analysis for type II endoleak, age, right external iliac diameter, angle of right iliac artery to aorta, and angle of AAA sac to neck are the important predictors in the model (canonical correlation of study is 0.303). In the discriminant analysis for occlusion, the distance from renals to aortic bifurcation and the angle of the AAA sac to the neck significantly contribute to the model (canonical correlation of study is 0.346). In the stepwise regression analysis for type II endoleak, smoking history, surgeon, and structure (branched graft or uni graft) were statistically significant contributors to the model. Final chi squared test with 6 df was 35.81 with p value <0.000. In the stepwise regression analysis for limb occlusion, a D4 value <19 and graft selection were statistically significant contributors. The final chi squared test was 22.094 with 5df and p = 0.001.

Conclusion: Few aspects of a patient's past medical history or preoperative anatomy seem to have a significant effect on the outcomes of type II endoleak or limb occlusion. The models did have high specificities but were poorly sensitive. Overall the models for limb occlusion were underpowered (11 cases). However, certain variables did show statistical significance and are worth noting.

Same day discharge following Percutaneous Endovascular Aneurysm Repair (PEVAR) - A single centre experience and related outcomes

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Objective: There is ever increasing trend toward minimally invasive surgical procedures. Total percutaneous access for EVAR has been reported to be safe and effective with acceptable success rates in the literature. Here we present a single centre experience with the same day discharge following PEVAR for AAA repair using the Perclose device.

Methods: Retrospective cohort study of patients undergoing PEVAR at single center since March 2010 discharged home on same day of the surgery. Patient characteristics, operative time, local and systemic complications, and rate of endoleak were recorded prospectively and analyzed.

Results: In total, 10 patients who underwent PEVAR since March 2010 were discharged home on the same day. Majority of patients were male (9/10), with average age of 72, and size of AAA 6.1 cm (5.0-8.4). The mean surgical time was 91 minute and there was no groin bleeding noted requiring open exploration in the OR. There were no wound infections, pseudoaneurysms or delayed bleeding after PEVAR with Perclose device. There was only 1 type II endoleak noted during postoperative follow up and managed conservatively.

Conclusion: Percutaneous EVAR may decrease surgical time and hospital stay compared to surgical cut down without an increase in local complications. Extra cost of Perclose device may be justified. Same day discharge may be safe and reasonable option in the right patient population.

Saturday, September 14th, 2013
Paper Session IV: Peripheral Vascular Disease

Angioplasty or primary stenting for infrapopliteal arterial occlusive disease: Meta analysis

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Background: There has been a significant development in the endovascular treatment of infra popliteal peripheral arterial disease. This meta-analysis pooled all of the randomized clinical trials (RCTs) that compared angioplasty (PTA) versus PTA plus stenting approaches for treatment of patients with infra popliteal chronic critical limb ischemia (CLI).

Methods: Five RCTs were identified after searching the Cochrane Library, MEDLINE and EMBASE databases from 1988 to 2013 for PTA versus PTA with stenting in patients with infra popliteal CLI. The outcome measures were primary-patency, limb salvage, all-cause mortality and re-intervention rates.

Results: Six months post intervention, there was a significant decrease in lesion re-stenosis rates in the PTA and stent group compared to PTA alone (risk ratio, 0.6 [CI, 0.43 to 0.83]). More re-intervention rates were observed in the PTA and stent group compared to PTA alone (risk ratio, 0.63 [CI, 0.42 to 0.96]). Although not statistically significant, there were fewer total limbs amputated in the PTA alone group compared to PTA and stent group (relative risk, 0.58 [CI, 0.32 to 1.06]). Lastly, fewer deaths were observed in the PTA and stent group compared to PTA alone; however, this data was not statistical significant, (relative risk 1.27[CI,0.65 to 2.50]).

Conclusion: With similar limb salvage rates between PTA alone and PTA with stenting, PTA alone of infra popliteal lesions seem to provide higher patency rates and fewer re-intervention procedures in patients with CLI. Although five randomized clinical trials were included in this meta-analysis, we believe that larger studies with longer follow ups are needed to properly identify the best treatment option of infrapopliteal arterial occlusive disease.

Diminishing Returns: The Relationship between Repeated Attempts at Revascularization and Major Amputation: A Single Centre Experience

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Background: Lower extremity revascularizations are performed for a number of reasons, including pain control, improved quality of life and level of function, maintenance of independence and limb salvage. These goals are met in the majority of cases but when revascularization fails a difficult decision must be made to treat conservatively (if possible), try further intervention, or proceed to amputation. Repeated failed attempts that ultimately lead to major amputation will have implications on resource utilization, may compromise the patient's overall health and well-being, and can significantly delay recovery and rehabilitation.

Objectives: This study reviews the impact and outcomes of repeated attempts at lower extremity revascularization. This is part of a larger initiative to develop a predictive model to help surgeons and patients make more informed decisions regarding these interventions.

Methods: A single institution, retrospective review of consecutive patients who underwent a revascularization procedure in the operating room for PAD from July 2010 to June 2011, specifically looked at the number of repeat procedures/operations, limb salvage, amputation rate, and mortality. Descriptive, multivariate regression and life-table analyses were performed.

Results: Initial results from a one-year pilot study found 374 limbs were treated in 338 patients. Mean age was 67 years old (range 42-97 years). 63% (n=237) were male, 39% (n=146) were current smokers, and 43% (n=162) were diabetics. Of the 374 limbs, 81% (n=303) were treated surgically and 19% (n=71) were treated endovascularly. Indications for surgery were similarly distributed across Rutherford classes 1-3, 4, 5, and 6. 10% (n=40) of patients ultimately went on to either an AKA or BKA. Of those requiring one re-intervention n=71, 17% required an amputation. Of those requiring two re-intervention n=27, 52% required an amputation. Of those requiring three re-intervention n=15, 67% required an amputation. Of those requiring four re-intervention n=3, 67% required an amputation. Of those requiring five re-intervention n=2, 100% required an amputation. All cause mortality at three-year follow up was 5.8% (n=17).

Conclusion: Our pilot study confirms a definite relationship between number of attempts at revascularization and major amputation. We plan to further elucidate this and many other factors with our ongoing prospective study and initiative to develop a predictive model to help guide decisions about lower extremity revascularization.

A Population-Based Description of the Indications for Lower Limb Amputation and Associated Outcomes across Canada

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Objective: To describe the indications and outcomes of lower limb amputations in the Canadian population.

Methods: A retrospective cohort study was carried out of all adult patients who underwent lower limb amputation in Canada between 2006-2009. Patients were identified from the Canadian Institute for Health Information's Discharge Abstract Database that includes all hospital admissions across Canada with the exception of Québec. Patients who underwent amputation following traumatic injury were excluded.

Results: 5342 patients were treated in 207 Canadian hospitals. The mean age was 67.5 ±13 years and 68% were male. Amputations were most frequently indicated after diabetic complications (81%), malignancy (3%), osteomyelitis (3%), or sepsis (1%). 65% of patients were discharged to another in-patient or long-term care facility and 26% were discharged home with or without extra support. Total number of amputations, length of stay, and discharge dispositions differed across providers (Table 1).

Conclusion: There is variability in the delivery of amputations and post-operative hospital discharges among surgical specialists across Canada. Future work is needed to investigate the reasons for this variability and develop initiatives to shorten post-operative hospitalization.

	Vascular Patients (n=1880)	Orthopedic Patients (n=1993)	General Surgery Patients (n=1335)	Other Patients (n=134)	p-value
Type of Amputation					
<i>Above-knee</i>	663 (35%)	386 (19%)	454 (34%)	37 (28%)	<0.001
<i>Below-knee</i>	1084 (58%)	1544 (77%)	785 (59%)	62 (46%)	
<i>Ankle/Foot/Toe</i>	133 (7%)	63 (3%)	96 (7%)	35 (26%)	
Average Length of Stay (days)	27 ± 38	29 ± 43	33 ± 42	38 ± 51	<0.001
Discharge Disposition (% of total)					
<i>In-patient facility (e.g. rehab)</i>	542 (29%)	318 (16%)	220 (16%)	25 (19%)	<0.001
<i>Long-term care facility or hospice</i>	721 (38%)	964 (48%)	605 (45%)	59 (44%)	
<i>Home or left against medical advice</i>	466 (25%)	546 (27%)	379 (28%)	39 (29%)	
<i>Died in hospital</i>	151 (8%)	165 (8%)	130 (10%)	11 (8%)	

Table 1: Type of procedure, average hospital length of stay, and discharge dispositions of patients undergoing amputations by vascular, orthopaedic, or general surgeons in Canada, 2006-2009. “Other patients” underwent amputations by other surgical and medical specialists. Percentages are of column total per service provider per type of amputation or discharge disposition.

The Pedometer and Walking Study (PaWS): A Pilot Project

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It is well-known that supervised walking programs are of great benefit to patients with intermittent claudication (IC) due to PAD, however, such a program is not readily available in all centres due to many factors.

We developed a 3-month long pilot study using 50 patients, randomized to one of two groups: pedometer or standard (walking) program. They were instructed to walk for a total of 30 minutes three times per week. Our endpoints were change in six-minute walking test (6MWT) distance and changes in ABI scores. We used the 6-minute walk test as a standardized outcome measure, and with a 25m change in distance as being clinically important.

To date, 39 patients have been randomized (control N = 19 pedometer N = 20), and 31 have completed the study; within this group, six patients have withdrawn either to disinterest, or other medical conditions. No adverse events have been reported thus far. Average age of the patients was 64.4 years. Groups were generally similar in terms of gender distribution, smoking history, diabetes and hypertension.

Of the patient group who have completed the study, those randomized to the pedometer group walked further than those not using the pedometer (avg. of 31.5m and 13m respectively). Subjects in the

pedometer group anecdotally reported less walking pain; they enjoyed the program and seeing their progress. ABIs did not change significantly. An unanticipated side effect has been a trend towards decreasing blood pressure more than 15 points systolic, more evident in the pedometer group.

We believe that the addition of a pedometer to conventional therapy in patients with IC is an inexpensive (less than \$40) yet worthwhile addition to their therapeutic regimen based on this pilot study. A larger study is necessary to appraise its true clinical potential.

Management of Acute Limb Ischemia in the Pediatric Population

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Objective: Acute limb ischemia (ALI) in pediatric patients is rare but may lead to limb loss and life-long complications. The aim of this study was to review the experience of a Canadian tertiary pediatric center with the medical and operative management of ALI.

Methods: The charts of in-patients diagnosed with acute upper or lower limb ischemia between 1999-2012 were reviewed. Patient demographics, arterial clot site and etiology, intervention, anticoagulation type and duration, and short and long-term complications were analyzed.

Results: 136 patients presented with signs of limb ischemia (46% female, 34% younger than 30 days, 51% between 1-12 months, and 15% between 1-18 years). 95% involved the lower limbs. 85% of arterial clots were totally occlusive. 92% were due to vessel catheterization, 5% were idiopathic, and 2% were due to hereditary hypercoagulable states. 96% were managed non-operatively. Patients were treated with a combination of thrombolysis, unfractionated or low molecular-weight heparin, aspirin and/or warfarin (duration 1 day – 13 years). All patients were followed post-discharge at our institution or at their referring hospital (average 3.5 years). 13% had complications related to ALI or anticoagulation (limb length or thigh circumference discrepancy, or intracranial hemorrhage). 25 patients died of unrelated causes (sepsis, multi-organ dysfunction, or cardiac failure).

Conclusion: In contrast with adults, ALI in children can generally be managed non-operatively with anticoagulation, likely because of their greater ability to develop arterial collaterals. Long-term follow-up by a multidisciplinary team of pediatric and surgical specialists and allied health professionals is integral to achieving a successful outcome.

The Role of Folic Acid on the Hyperhomocysteinemia in the Buerger`s Disease

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Objective: The aim of the study is to evaluate the prevalence of the hyperhomocysteinemia and level of the anticardiolipin antibodies, and the role of folic acid on the hyperhomocysteinemia and on the rate of the amputations in the patients with Buerger's disease (BD).

Methods: In an experimental placebo-controlled double-blinded study, between 2004-2010, thirty patients with BD were randomly assigned into two groups (14 patients in drug group and 16 patients in placebo group). Exclusion criteria were those who had history of hypertension, diabetes mellitus, ischemic heart disease, cerebrovascular disease, and collagen vascular diseases. In addition, they were excluded if they were treated with surgical (sympathectomy or vascular bypass) or medical (Illeoprost or corticosteroid) treatment during the study, or if they used Aspirin, calcium channel blocker, Vitamin B6 or B12, or if they stop smoking or if they didn't have compliance for medication during the study. Drug or placebo was administered and they were followed in 2 and 6 months later for homocysteine, anti-cardiolipine antibodies and the risk of amputations.

Results: At the beginning of the study homocysteine level was higher than normal in 19 patients (63%) (Normal value = 15mg/dl). There was significant decrease in homocysteine level during 6 month in folic Acid group ($p < 0.001$), but there was no change in placebo group. The difference between groups was significant after the 2nd month of the study and also in the 6th month. None of our patients had elevated anticardiolipin antibodies. Anticardiolipin antibody didn't changed during 6 month of study in none of groups. High level of homocysteine did not associated with more amputations during 6 month of study ($p > 0.05$).

Conclusion: This study showed the hyperhomocysteinemia in BD, and the benefit of folic acid treatment in homocysteine lowering, but folic acid didn't inhibit the risk of major and minor amputation during 6 month of follow up. Longer follow up may reveal the role of folic acid in these patients.

Saturday, September 14th, 2013

Paper Session V: Venous Disease and Dialysis Access

Outcomes after Endovenous Ablation for the Treatment of Varicose Veins: A Single-Center Experience

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Objectives: To evaluate the three-year experience with endovenous radiofrequency ablation (RFA) for the treatment of varicose veins at a single center in Ontario.

Methods: We conducted a chart review of patients who underwent RFA therapy between 2010-2012 at the first center to offer this treatment modality in Canada. Patient demographics, number of limbs and vein lengths treated, radiofrequency duration and 1-month complications were noted and confirmed by duplex scan. Patients were also asked to provide feedback on the procedure using the Venous Clinical Severity Score (VCSS) questionnaire.

Results: One hundred and forty-eight patients (81% female, average age 54 ± 15 years, 82% CEAP2, 10% CEAP3, 3% CEAP4, 4% CEAP5, and 1% CEAP6) underwent RFA between January 2010 to December 2012. In 30% of patients, both legs were treated during the same procedure. The average length of veins treated was 42.2 ± 21.6 cm. The average radiofrequency duration was 218 ± 113 seconds. Most patients required no pain medications or only over the counter analgesics, and only one patient required a

prescription for opioid medications. The average length of time patients required before returning to work was 2.3 ± 3.2 days. While 92% of patients had no adverse outcomes, 4% developed skin discoloration, 2% chronic pain, 1% numbness and parasthesia, 1% developed superficial phlebitis in a tributary vein, and 1% developed heat-induced thrombosis of the common femoral vein. Occlusion of the treated veins was confirmed by duplex ultrasound scan 2 weeks after the procedure in all but one patient. Of the patients who provided feedback (45% response rate), 95% were very or extremely satisfied with the procedure. All of those patients said they would have the procedure again and would recommend it to a friend.

Conclusions: RFA is a safe and effective intervention for the treatment of varicose veins that is associated with a low complication rate and excellent patient satisfaction.

Vascular Surgeon's Management of Venous Disease in Canada: Preliminary Data

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Background: Venous disease is the most common vascular issue encountered in the community. Vascular surgeons' (VS) involvement in venous management varies across Canada but can represent a large component of practice. Trainee involvement in the management of venous disease is often limited. With the publication of venous guidelines, interest from generalists and other specialists, advances in endovenous interventions, and changes in government policies, the role of VS in this issue needs attention.

Objectives: To obtain an overview of VS practice patterns and attitudes related to venous disease management.

Methods: A detailed electronic survey was developed similar to published surveys from other countries and sent to practicing VS in Canada. The data was collated and compared to reports from elsewhere to develop a comparative management map for VS management of venous disease.

Results: 82% of respondents were in general vascular practice; 9% confined practice to a venous clinic and venous disease represented between 1 and 25% of practice in 73% of respondents. Indicators for consultation were venous ulcer (100%), SVT (82%), and leg swelling (82%). Increased referrals were seen over the past 5 year (55%). VS treat SVT with Duplex and selective treatment (64%) or symptomatically (40%); 82% state they follow CHEST guidelines. VS believe PCPs (80%) and other specialists (33%) do not understand venous disease well. Venous oriented CE represents a component of CE for 67% of VS. Specific training in venous issues was poorly represented in residency training: support stockings (60%), sclerotherapy (30%), EV ablation (20%), and IVC filters (11%).

Conclusions: Preliminary data suggests that VS are involved in venous practice they had limited training during residency and do pursue CE and include guidelines in their practice. More detailed data is required to allow a comparison to venous practice in other countries and to more fully understand training priorities.

Pharmacologic Management of Venous Disease

DL. Wooster

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Background: Patients with chronic venous disease, including varicose veins, can have their disorder controlled with support stockings and, in selected patients, direct interventions. Many patients present with a variety of medications, often not available in Canada, asking for advice from a vascular surgeon. Venoactive agents (VA) have been identified and are ingredients in numerous poorly standardized formulations. None are available in Canada as medically-recognized pharmacologic management for venous disease; as such, knowledge of these preparations is frequently lacking.

Objectives: The aims of this report were to identify potential venoactive agents, describe the pharmacologic mechanism of action and the results in management of venous disease.

Methods: An electronic literature search was performed to identify 1. VA ingredients in available formulations, 2. Action of VA and 3. Results of VA management of venous disease.

Results: Over 1 million citations returned; the majority were non-scientific. 37 VA were identified; the detailed mode of action, impact on venous disease, potential side effects and clinical outcomes were available on 5 classes of VA. These included flavonoids, rutosides, hidrosimine, escins and centella. There are 44 randomized trials showing clinical effectiveness with improvement identified in 35 -60 % for clinical appearance, symptoms of heaviness, restless legs and edema. Described side effects were limited to local sensitivity. No clear correlation of results with CEAP classification or VSS was identified.

Conclusions: Certain venoactive agents have been well-studied and do show clinically efficacy. It is important to vascular specialists to be aware of them. Although the evidence is not strong, availability of consistent formulations and management recommendations could lead to improved patient care.

One-stage compared to two-stage brachio basilic fistula creation for hemodialysis access: results of a large retrospective cohort study

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Introduction: In accordance with published guidelines, at our institution brachio basilic arteriovenous fistula creation for hemodialysis access is utilized when distal extremity AV fistula have failed to mature or when the patients anatomy is unsuitable for a cephalic vein fistula. Brachio basilic transposition can be performed in a single operation, or can be staged and completed in two operations. The purported benefits of a single stage approach include a shorter duration of catheter based dialysis, and the convenience of a single operation. Recent reports have suggested that a staged approach results in reduced non-maturation rates and improved fistula patency. Although the trend at our institution is towards a two-staged approach, there remains clinical equipoise as to the best method of brachio basilic AV fistula creation. The primary goal of this study is to determine if a two-staged approach leads to reduced primary failure rates when compared to single stage brachio basilic fistula creation. Secondary goals are to determine differences in primary patency, secondary patency and overall complication rates between cohorts.

Methods: A review of all patients requiring brachio basilic arteriovenous fistulae for hemodialysis access at a single University between 2005 and 2012. The study was designed as a retrospective cohort study

with patients divided into single stage or planned two-stage cohorts. All patients having attempted AV fistula creation, even those that never require hemodialysis, are captured within our prospectively maintained renal access database. The database was reviewed by 2 reviewers and captured all patients who had a brachiobasilic fistula at two large academic hospitals.

Results: A total of 169 patients underwent attempted brachiobasilic arteriovenous fistula creation during the years of the study. Sixty-nine patients had the fistula created at a single operation and formed the single stage cohort. One-hundred patients had the fistula created using a pre-planned two-stage approach and formed the two-stage cohort. There was no difference in the primary endpoint of non-maturation, with 23.2% of single stage patients and 27.0% of two stage patients failing to achieve a functional fistula ($p=0.567$). At one year, 64.1% of patients in the single stage cohort were dialyzing through their fistula compared to 59.3% of two stage patients ($p=0.532$). At two years, 53.1% of single stage patients were functional, compared to 44.1% of two stage patients ($p=0.07$).

Conclusion: Despite a recent trend towards using a two-stage approach for brachiobasilic fistula creation, this large, prospective cohort study was unable to detect any difference in maturation and fistula patency between the single stage and two stage approach.

Saturday, September 14th, 2013
Paper Session VI: General Vascular Topics

Comparison of Cerebral Oximetry and Transcranial Doppler In Decision to Shunt for Carotid Endarterectomy

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Conducting Carotid Endarterectomy under general anaesthetic compromises cerebral function monitoring compared to operating on the awake patient. Surrogate systems include EEG, Transcranial Doppler and Stump pressure monitoring. Cerebral Oximetry is another modality that has been used in other settings but has not had widespread use in carotid surgery.

Purpose: To evaluate the use of cerebral oximetry (COX) against more established technology, Transcranial Doppler (TCD) and Stump Pressure (SP) and determine if it correlates adequately to act as a stand alone monitor and decision tool for selective carotid shunting.

Method: A consecutive series of patients presenting for carotid endarterectomy were analyzed prospectively. Fifty patients were studied and 45 complete data sets were analyzed. Five patients were deleted due to inability to find a temporal window allowing TCD monitoring. Decision to shunt was based on Transcranial Doppler response based on a long standing protocol in our institution. Reduction of Mean TCD velocity of 50% or greater following clamping would dictate the use of an indwelling shunt.

Results: There were 32 male patients, 13 female. Average age was 71.3 years. Thirty five patients were symptomatic 10 were asymptomatic.

Table 1.

Gender	32M/13F
Age	71.3
Symptomatic	35/45
Shunt used	20/45
Post operative Stroke	0
Post operative death	0
COX Baseline Mean (+/- SD)	53.8(20.9)
COX Post Clamp Mean (+/- SD)	65.5(11.93)
COX % change Post Clamp (+/-SD)	.99 (.16)

Conclusions: Cerebral Oximetry correlated well with the stump pressure (mean) and showed a significant difference in the shunted and non- shunted patients ($p < .05$) that would allow it to be used as a tool in a selective shunting decision algorithm. More information is needed to explore the sensitivity of this technique.

Relationship between popliteal artery aneurysm size and symptomatic status

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Objective: To compare the presence of symptoms in patients undergoing popliteal aneurysm repair in a tertiary care center for small (<4cm) and large (>4cm) aneurysms.

Methods: Using a prospectively collected vascular surgery database at a tertiary referral center, a retrospective cohort study was performed. All patients who had surgical repair of popliteal aneurysm were included from 2003 – 2012. The presence of symptoms was compared between large aneurysms (> 4cm) and small aneurysms (< 4cm). The size of aneurysm, presence of mural thrombosis and distal run-off were also compared between symptomatic and asymptomatic patients. Short and long-term re-intervention and amputation rates were also compared between these groups.

Results: A total of 68 patients undergoing popliteal aneurysm repair were enrolled with 43 having information about symptoms. There were 20 patients who were asymptomatic and 23 patients who reported symptoms of claudication, compression or ischemia. There was no difference in the proportion of symptoms in small compared to large aneurysms (52.1% small, 55.0% large, $P=0.85$). There was no difference in the size of aneurysms between symptomatic and asymptomatic groups ($P=0.59$). There was an increased proportion of symptomatic patients with mural thrombosis ($P=0.045$) or a history of smoking ($P=0.052$). Amputation rates at 2 years were considerably higher in the symptomatic patients (asymptomatic 0%, symptomatic 20%, $P=0.03$).

Conclusion: The belief that popliteal aneurysm size and progression to symptoms has been debated. Despite this belief we have shown that the size of aneurysm is not associated with symptoms even when

larger than 4 cm. Furthermore, our data supports the mounting evidence that aneurysm characteristics and patient co-morbidities contribute to the likelihood of developing symptoms in popliteal aneurysms.

Visceral Artery Aneurysm/Pseudoaneurysm Management: Comparison of Endovascular and Surgical Treatments.

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Objective: Visceral artery aneurysms and pseudoaneurysms (VAA) are rare clinical entities that can be treated by surgical or endovascular means. The purpose of the study was to evaluate the clinical features, imaging, treatment, clinical outcomes, and to determine the dominant mode of treatment for VAA at our institution.

Materials and Methods: From January 2009 to January 2012, 30 aneurysms were treated in 28 patients (12 male, 16 female, mean age 55 years) at our institution. Endovascular treatment was utilized in 26 patients; arteries involved were splenic 13, superior mesenteric 2, hepatic 3, gastroduodenal 2, renal 5, and gastroepiploic 1. Surgical resection was utilized in 2 patients; 1 superior mesenteric artery and 1 involving the confluence of the gastroduodenal and common hepatic arteries. Indications for treatment included incidental (size > 2cm diameter) 12; bleeding/rupture 7; post-surgical/post-traumatic 4; familial/vasculopathy 4; and hypersplenism secondary to portal hypertension 1. Endovascular treatments included coils alone 11; coils and cyanoacrylate glue 7; coils and absorbable gelatin sponge 3; Amplatzer plug, cyanoacrylate glue, and coils 1, stent grafting 2, and direct sac puncture with glue injection 3. Follow-up based on clinic visits or diagnostic imaging was available in 24 of the 28 patients with a mean follow-up time of 11 months.

Results: 23 of the 24 patients with follow-up had successful treatment of their aneurysms. Of those, 16 had no complications; 5 had asymptomatic areas of target organ infarct noted on imaging; 1 thrombosed aneurysm became infected requiring drain insertion; 1 developed pancreatitis with a pseudocyst requiring surgical drainage. The 24th had incomplete treatment of their renal artery aneurysm owing to non-target embolization of glue during the procedure requiring placement of an aortic stent graft. The 2 surgically treated patients had successful treatment of their aneurysms, 1 patient (hepatic artery/gastroduodenal aneurysm) had asymptomatic areas of hepatic infarct on imaging.

Conclusion: Endovascular treatment of VAA is safe, effective, and now the dominant method of treatment at our institution. However, surgical management still has a role in certain cases.

Prevalence of Carotid Body Tumours in a Vascular Laboratory in Bogota, Colombia

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Objective: Identify Carotid Body Tumour (CBT) prevalence in the Vascular Laboratory of Bogota Vascular Clinic. In Bogota, a city located over 2000 meters over sea level; surgery for this condition is more frequent than carotid endarterectomy.

Methods: A retrospective single site study was conducted. Study population was patients referred for carotid duplex scanning examinations from September 2007 to September 2012. Patient's demographics, symptoms and Duplex results were analyzed to estimate the prevalence of carotid body tumours, its size and an analysis of patients with incidental small tumours.

Results: Over the past 6 years, we performed 3,589 carotid duplex scanning examinations in our Vascular Laboratory. A total of 128 patients, with 139 tumours were diagnosed of a new CBT, with a prevalence of 3.61%. The patients were referred for palpable mass in 88 (69%). For suspected carotid artery disease in 32 (31%). Of these patients, 15 (11.7%) were men and 113 (88.3%) women. The mean age was 59.7 years (range, 26-91 years). Sixty (46.8%) tumours were located on the right side, 57 (44.5%) on the left and 11 (8.7%) patients were bilateral. The mean tumour size was 2.47 centimeters, range (0.64 -5.19). Thirty nine (28.4%) less than 2 , 95 (68%) between 2.0 and 5.0 cm and 5 (3.6%) greater than 5 cm less. Twenty seven patients with incidental small tumours have not received surgical treatment and are currently being followed with yearly duplex scan in our Vascular Lab.

Conclusion: Duplex scanning is a frequent examination to diagnose carotid artery disease. The prevalence of incidental CBT in vascular labs of high altitude cities is a trend. Diagnosis of small non palpable tumours is more frequent. Since surgical resection has been recommended for CBT independent of size and even small tumours resection is associated with complications, further research of high altitude carotid body tumour will better determine its surgical indications.

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