Canadian Society for Vascular Surgery
La Société canadienne de chirurgie vasculaire

34TH ANNUAL MEETING ON VASCULAR SURGERY

SEPTEMBER 28-29 2012
LOEWS LE CONCORDE HOTEL
QUÉBEC, QC

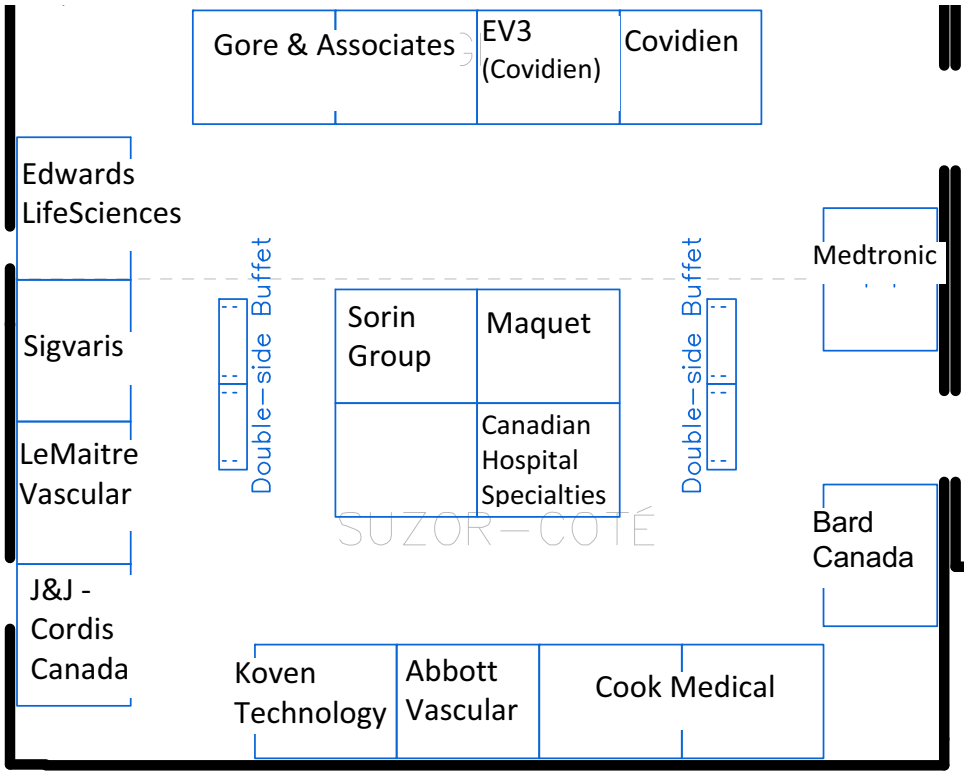
FINAL PROGRAM/PROGRAMME FINAL

Please visit the exhibit area to meet the 2012 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 28th	0700-0745
	0930-1000
	1500-1530
Saturday, September 29th	0700-0745
	0945-1015
	1430-1500



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1980 President Allan Downs
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1981 President John Gutelius
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Program Chair Kent MacKenzie

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Secretary Gerrit Winkelaar
Treasurer Jacques Tittley
Program Chair Andrew Dueck

2011 President Jerry Chen
Secretary Gerrit Winkelaar
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Our sincere thanks for their efforts.

CANADIAN SOCIETY FOR VASCULAR SURGERY INVITED GUEST LECTURERS

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

PREVIOUS MEETINGS

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

PRESENT MEETING
2012 Québec City

FUTURE MEETINGS
2013 Edmonton
2014 Toronto

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 speciality that encompasses not only the surgical management of atherosclerosis but also provides conservative therapy and nonoperative 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 34th Annual Meeting taking place September 28th and 29th, 2012

1. The participants will be able to describe management of aortic pathologies
2. The participants will be able to discuss issues relating to vascular imaging
3. The participants will be able to appreciate advances in the management of patients with peripheral vascular disease
4. The participants will be aware of advantages and disadvantages of recent changes to Vascular Surgery training in Canada
5. The participants will be able to identify strengths and weaknesses in Vascular Surgery knowledge by their involvement in the VSEP Jeopardy session
6. The participants will become aware of current research into vascular diseases in Canadian Centers

The program will provide scientific or clinical presentations by the general membership stressing the opportunity for the participant to discuss and contribute opinions and evaluations. Accepted manuscripts will be submitted for publication in a peer reviewed journal.

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 Surgeons. The **maximal CME credit is 13.75 hours.**

Canadian Society for Vascular Surgery

34th Annual Meeting
September 28 - 29, 2012, Loews Le Concorde Hotel
Quebec, QC

PROGRAM at a GLANCE

Thursday, September 27 | jeudi le 27 septembre 2012

12h00-13h00	**CSVS Executive Committee Luncheon** *(closed)* Boardroom
13h00-17h00	**CSVS Executive Committee Meeting** *(closed)* Boardroom
17h00-20h00	**RCPSC Vascular Surgery Specialty Committee Meeting** *(closed)* Suite 415
18h00-20h00	**CSVS Registration Desk** opens - Foyer *Ouverture du bureau d'inscription de la SCCV*

Friday, September 28 | vendredi le 28 septembre 2012

07h00	**CSVS Registration Desk** opens Foyer *Ouverture du bureau d'inscription de la SCCV*
07h00 – 07h45	**Continental Breakfast** | *Petit Déjeuner - Suzor-Cote/Krieghoff 2* ★ **Poster presenters to set-up in Borduas/Krieghoff 1**
07h45 – 08h00	**Welcome and Opening Remarks** Borduas/Krieghoff 1 **President**: Dr. James Dooner **Program Chair:** Dr. Keith Baxter **Secretary**: Dr. Greg Browne
08h00 - 09h30	**Paper Session I: Aortic Intervention** Borduas/Krieghoff 1 Moderators: *Dr. Gerrit Winkelaar, Dr. Kent MacKenzie* Objectives: Upon completion of this session, attendees will be able to: **1. Describe issues related to aortic aneurysms and dissection** **2. Understand complications associated with repair of aortic pathologies** **0800-0815** Improve trial: Challenging anatomy of ruptured abdominal aortic aneurysm *Presenter: T. Forbes* **0815-0830** Elective AAA repair: do octagenarians do worse than other patients *Presenter: M. A. Lortie* **0830-0845** Patterns of visceral and renal vessel involvement in aortic dissection *Presenter: P. Ravichandran* **0845-0900** Comparison of knowledge and attitudes of primary care physicians towards abdominal aortic aneurysm screening in Canada and Ireland *Presenter: D. Wooster* **0900-0915** Vascular graft infections: A single center review *Presenter: Y. Abdulerehman* **0915-0930** Technical factors are strongest predictors of postoperative renal dysfunction following open juxtarenal aneurysm repair *Presenter: L. Dubois*
09h30 - 10h00	**Refreshment Break & Exhibits** | *Pause santé et exposants* Suzor-Cote/Krieghoff 2

10h00-11h15	**Paper Session II: Aortic Aneurysm EVAR** Borduas/Krieghoff 1 Moderators: Dr. Jacques Tittley, Dr. Benjamin Heisler Objectives - Upon completion of this session, attendees will be able to: 1. Describe advanced endovascular treatment options for thoracoabdominal aortic aneurysms 2. Understand issues of EVAR surveillance and secondary intervention **1000-1015** Type II endoleaks post EVAR: incidence, rate or aneurysm sac enlargement and success of endoleak treatment *Presenter: J. Dunn* **1015-1030** Ultrasound for follow up of endovascular aortic aneurysm: Is CT necessary? *Presenter: D. O'Brand* **1030-1045** Trends in the utilization of endovascular therapy for elective and ruptured thoracic abdominal aortic aneurysm procedures across Canada *Presenter: P. Jetty* **1045-1100** Fenestrated stent graft experience of juxtrarenal abdominal aortic aneurysms at two teaching hospitals in Vancouver, BC *Presenter: D. Kopac* **1100-1115** Patency of the contralateral internal iliac artery in aortouniiliac endografting *Presenter: S. Hossain*
11h15-11h45	**CSVS Invited Guest Lecture I** Borduas/Krieghoff 1 **"Advancing Care for Aortic Occlusive Disease"** *Daniel Clair, MD, Chairman of the Department of Vascular Surgery, Cleveland Clinic, Cleveland Ohio* Objectives – upon completion of this session, attendees will be able to: 1. Recognize that aortic diseases that can be treated with an interventional approach 2. Understand the feasibility of using a percutaneous approach 3. Incorporate hybrid technique in treating patients with aortoiliac occlusive disease
11h45-13h30	**CSVS Annual General Meeting** (CSVS members only – lunch served) - *Jean-Paul Lemieux* *Assemblée générale annuelle et déjeuner (réservé aux membres de la SCCV)*
13h30-15h00	**Paper Session III: General Vascular Topics -** Borduas/Krieghoff 1 *Moderators: Dr. Greg Browne, Dr. Karim Alibhai* Objectives - Upon completion of this session, attendees will be able to: 1. Describe management options for a variety of vascular issues, including arterial steal following dialysis access, superficial venous thrombosis and carotid endarterectomy. 2. Understand issues related to vascular imaging **1330-1345** Prevelance and significance of extravascular incidental findings on computed tomographic angiographic and magnetic resonance angiography *Presenter: R.Y. Yang* **1345-1400** Alterations in gravitational mechanical loading: Effects on endothelial cells *Presenter: M. Grenon* **1400-1415** Radiation dose passport for vascular patients *Presenter: K. Phillips* **1415-1430** Where to DRIL: Finding the best inflow for the DRIL procedure *Presenter: D. Kopriva* **1430-1445** Superficial vein thrombosis in a community setting: The need for a management algorithm *Presenter: D. Wooster* **1445-1500** Safely of carotid endarterectomy without shunt *Presenter: R. Karam*

15h00-15h30	**Refreshment Break & Exhibits** | *Pause santé et exposants* *Suzor-Cote/Krieghoff 2*
15h30 - 16h30	**VSEP Jeopardy** *Borduas/Krieghoff 1* Moderator: Dr. Ravi Sidhu Objective: Upon completion of this session, participants will be able to identify strengths and weaknesses in their knowledge of a variety of vascular topics.
16h30 – 18h00	**CSVS Poster Session -** *Borduas/Krieghoff 1* *Wine & Cheese amongst the posters* ***Patient Preferences for Location of Abdominal Aortic Aneurysm Surgery with Implications for Regionalization-*** *JH Landau* ***Analysis of fifteen years of wait time 1 and 2 data in Vascular Surgery at Kingston General Hospital 1996 –*** *2011- D.T. Zelt* ***Flared textile cuff to reinforce the proximal sealing zone of fenestrated stent-grafts -*** *F. Wang* ***IVC Tumour Encasement: A Case Series and Review of the Literature –*** *J. Harlock* ***An Ironman with Incapacitating Claudication: A Case Report-*** *P. Nault* ***Elective Repair of Abdominal Aortic Aneurysm with Endovascular or Open Approach: Up to Date Meta-Analysis –*** *M. Qadura* ***Detailed Analysis of a Series of Explanted Talent AAA Stent-Grafts-Biocompatibility Issues -*** *B. Li* ***A National survey of elastic compression stockings prescription rates following diagnosis of deep venous thrombosis and patient perspective –*** *K. Ahmed* ***Quality of Life Outcomes after Open versus Endovascular Abdominal Aortic Aneurysm Repair: Meta-analysis and Systematic Review -*** *LL Nguyen* ***Abdominal aortic stent-grafts: from infancy to maturity –*** *R. Guidoin*
18h30	**President's Dinner** (CSVS Executive Committee Members only)

Saturday, September 29 \| samedi le 29 septembre 2012

07h00	**CSVS Registration Desk** opens Foyer *Ouverture du bureau d'inscription de la SCCV*
07h00 – 07h45	**Continental Breakfast** | *Petit Déjeuner* Suzor-Cote/Krieghoff 2
07h45-08h15	**Presentation of 2012 Award Winners** Borduas/Krieghoff 1 • Cook Award for Endovascular Therapy Research (presented by Dr. Tom Forbes) • Gore Research Award (presented by Dr. Tom Forbes) • John L. Provan Education Award (presented by Dr. Kent Mackenzie) **2011 Cook Award, Gore Award and Provan Award – project updates**

08h15 – 09h45	**Paper Session IV: Peripheral Vascular Disease I** - *Borduas/Krieghoff 1* Moderators: *Dr. Don McCarville, Dr. Tom Forbes* Objectives: Upon completion of this session, attendees will be able to: 1. Describe issues related to management of patients with peripheral ischemia 2. Understand association of lower extremity ischemia with other systemic diseases **0815-0830** Vascular quality of case assessment: How admission to a vascular surgery service affects evidence-based risk factor modification in patients with lower extremity peripheral arterial disease *Presenter: N. Steenhof* **0830-0845** Factors related to walking performance in claudicants *Presenter: P. M. Brown* **0845-0900** Prediction of limb salvage after arterial reconstruction for mangled extremities *Presenter: M. Elsharawy* **0900-0915 TCOM study -** Transcutaneous oximetry as a prediction tool for chronic wound and amputation healing outcomes *Presenter: K. Arsenault* **0915-0930** The use of reentry devices improves the procedural safety and clinical outcomes of recanalization of iliac artery occlusions *Presenter: J.M. Panneton* **0930-0945** Peripheral arterial disease and vulnerability to cardiovascular events: Data from the heart and soul study *Presenter: M. Grenon*
09h45-10h15	**Refreshment Break & Exhibits | Pause santé et exposants** - Suzor-Cote/Krieghoff 2
10h15-11h00	**Paper Session V: Peripheral Vascular Disease II** - *Borduas/Krieghoff 1* Moderators: *Dr. Giuseppe Papia, Dr. James Dooner* Objectives: Upon completion of this session, attendees will be able to: 1. Describe issues related to management of patients with peripheral ischemia 2. Understand association of lower extremity ischemia with other systemic diseases **1015-1030** Association between depression and peripheral arterial disease: insights from the heart and soul study *Presenter: M. Grenon* **1030-1045** Risk factors for premenopausal peripheral arterial disease *Presenter: A. Ducas* **1045-1100** Early experience with simultaneous hybrid revascularization for co-existent iliofemoral and infrainguinal occlusive disease *Presenter: P. Ravichandran*
11h00-11h30	**CSVS Invited Guest Lecture II** *Borduas/Krieghoff 1* **"Making Sense of Carotid Stenting Data" Dr. Daniel Clair,** *Chairman of the Department of Vascular Surgery, Cleveland Clinic, Cleveland Ohio* Objectives: Upon completion of this session, attendees will be able to: 1. Understand the differences between stroke mortality and stroke death mortality outcomes for patients with carotid stent vs. carotid endarterectomy 2. Identify high risk individuals for both carotid surgery and carotid stenting 3. Incorporate a decision tree model for choosing appropriate therapy for patients with carotid stenosis

11h30 – 12h00	**Presidential Address -** Dr. James Dooner *Borduas/Krieghoff 1*
12h00 – 13h30	**Lunch**
13h30- 14h30	**The Great Debates** - *Borduas/Krieghoff 1* Moderator: *Dr. Keith Baxter* Objectives: Upon completion of this session, attendees will be able to: 1. Appreciate benefits and drawbacks of specialty versus subspecialty training in vascular surgery 2. Recognize implications of endoleakage following EVAR **Debate I:** Be it resolved that the training of vascular surgeons in a 5 year specialty residency program is superior to a 2 year sub-specialty fellowship. **For:** *Dr. Ravi Sidhu* **Against:** *Dr. Rafik Ghali* **Debate II:** *Be it resolved that type II endoleaks following EVAR are not benign and should be treated.* *For: Dr. Jeremy Harris Against: Dr. Mark Nutley*
14h30 – 15h00	**Refreshment Break & Exhibits | Pause santé et exposants** - Suzor-Cote/Krieghoff 2
15h00 – 16h15	**Paper Session VI: Vascular Education and Research** - *Borduas/Krieghoff 1* Moderators: Dr. Jerry Chen, Dr. Jeff Pasenau Objectives: Upon completion of this session, attendees will be able to: 1. Describe current studies evaluating EVAR implementation and graft design 2. Understand factors that influence medical students to choose a career in vascular surgery **1500-1515** A prospective, randomized, crossover observational study comparing medical student's ultrasound guided technique vs a novel real time needle guidance ultrasound technique for vascular access using a phantom gel model *Presenter: D. Kopac* **1515-1530** National EVAR fluoroscopy times study *Presenter: J. Clouthier* **1530-1545** Preparation and biocompatibility assessment of woven silk fibroin and polyester (PET) small diameter vascular prostheses *Presenter: L. Wang* **1545-1600** Fatigability of stent-graft woven fabrics with zig-zag versus ringed stents *Presenter: J. Lin* **1600-1615** Sparking interest: Why medical students choose vascular surgery as a career *Presenter: T. Roy*
16h15 – 16h30	**Presentation of the 2012 Sigvaris President's Award** *Borduas/Krieghoff 1* **and Josephus C. Luke Award -** *Presenters: Dr. Keith Baxter and Dr. James Dooner*
16h30	**Meeting Adjournment** - *Borduas/Krieghoff 1*
16h30- 18h00	**Exhibits Dismantling** - *Suzor-Cote/Krieghoff 2*
18h30	**CSVS 2012 Annual Dinner** ***"Musée de la civilisation" - 85 Rue Dalhousie, Québec*** ***Cocktail 18:30 - Dinner 20:00*** *(Advance registration and dinner ticket required)*

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 Secretariat 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 President will notify the recipient. The Treasurer will send the monetary reward of $500.00. The Secretary will arrange for him/her to receive the appropriate plaque. 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 annually. 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.

Improve Trial: Challenging Anatomy of Ruptured Abdominal Aortic Aneurysms

Thomas L. Forbes, Teresa V. Novick, Guy DeRose, Jeremy R. Harris on behalf of the IMPROVE Trial Investigators (Division of Vascular Surgery, London Health Sciences Centre & University of Western Ontario, London, ON)

Purpose*:* The multicenter IMPROVE (Immediate Management of the Patient with Rupture: Open Versus Endovascular Repair) Trial randomizes patients with ruptured abdominal aortic aneurysms (rAAA) to open repair or CT scan and endovascular repair if possible. This report describes the aneurysm anatomy of patients with CT confirmed rAAA.

Methods: Patients with clinical diagnosis of rAAA were randomized to open repair or to CT scan and endovascular repair if possible. CT scans were uploaded and analyzed centrally.

Results: By the end of 2011 over half of the necessary 600 patients have been recruited. This report describes the first 54 patients with CT confirmed rAAA. The following parameters were measured:

N=54	Max AAA diameter (mm)	Neck diameter at renals (mm)	Neck diameter 1cm below renals (mm)	Neck length (mm)	Iliac diameter (mm)	Neck atheroma (%)	Angle between neck & AAA (^{o})
Median	81.0	24.0	26.0	16.0	15	45	48.0
IQR	70.3-93.8	20.2-27.0	21.0-35.0	6.5-29.8	13-20	0-75	27.5-64.0

These were large aneurysms with 21 (38.9%) having neck lengths ≤ 10mm, and 12 (22.2%) with neck lengths ≤ 5mm. Excluding the 12 patients with short, ≤ 5 mm, neck lengths 14 of the remaining 42 (33.3%) had conical necks (≥2mm dilatation) and 7 (16.7%) had reverse conical neck (≥2mm narrowing) configurations. Less than half (22 patients or 40.7%) of the CT scans exhibited anatomy that would satisfy the instructions for use of commonly used bifurcated endografts.

Conclusion: These rAAA patients have large aneurysms with frequent suboptimal anatomy for endovascular repair. The selection of open or endovascular repair is dictated by this anatomy as is the specific endovascular technique. Endovascular repair with suboptimal anatomy could sacrifice improved short term results for poorer longer term outcomes and more frequent reinterventions.

Elective AAA repair : Do Octagenarians Do Worse Than Other Patients?

Lortie M-A, Montreuil B, Beaudoin N, Blair J-F, Elkouri S

(Division of Vascular Surgery, University of Montreal)

Methods: We performed a retrospective review of consecutive patients with asymptomatic AAA who underwent elective repair, both EVAR (n=94) and open (n=144) in one vascular surgery department during a five year period. We divided patients in 2 groups: 70-79 years old and 80 years old and older. The primary outcome was to compare post-operative morbidity and mortality during the same hospitalization. The secondary outcome was to analyse factors that influence in-hospital mortality.

Results: Between January 2005 and January 2011, 238 patients were operated; 181 were between 70-79 years old and 57 were 80 years old or older. Differences in their demographic characteristics and comorbidities were not statistically significant except for active smoking (43% vs 25% respectively; p=0,02) and AAA diameter greater than 6 cm (33% vs 63% respectively; p=0,0001). There were more open surgeries in the 70-79 year-old group (66% vs 42%; p=0,02). No statistically significant differences were observed in post-operative complications except that atrial fibrillation was less frequent in the 70-79 group (7% vs 18%; p=0,27). There were 3,3% hospital deaths in the 70-79 group (6/181) vs 8,8% in the 80+ group (5/57) (p=0,17). Logistic regression demonstrated that chronic renal insufficiency (OR=6,1), concomitant iliac aneurysm repair (OR=7,2), CHF (OR=10,6) and AAA diameter greater than 6 cm (OR=8,2) were associated with increased mortality risk.

Conclusion: Comparison of outcomes between septuagenarians and octogenarians after AAA repair did not demonstrate statistically significant differences in complications and in-hospital mortality though there was a trend towards increased mortality in the octogenarian group.

Patterns of Visceral and Renal Vessel Involvement in Aortic Dissection

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Objectives: To describe patterns of visceral vessel involvement and associated outcomes in aortic dissections.

Methods: CT scans of 39 patients with aortic dissections were reviewed (30 Type B, 9 Type A). The celiac artery (CA), superior mesenteric artery (SMA), and renal arteries (RA) were recorded as perfused by the true or false lumen (TL or FL). Subsequent scans, over a median follow-up of 2 years (range 0 to 10), were reviewed for thrombosis, stenosis, or aortic dilatation.

Results: Of the 156 vessels analyzed, 50 (32%) were supplied by the FL. Nine patterns of branch vessel involvement were identified. The most common patterns observed were isolated FL supply of a RA (right 33.3%, left 17.9%) with the visceral and contralateral RA perfused by the TL. In 6 patients (15%), all vessels were supplied by the TL. 12.8% of patients demonstrated FL supply of all vessels except for the right RA and 10.3% of patients had FL supply of the CA and left RA. The remaining four patterns were each identified in a single patient. On follow-up imaging, 5 patients with FL RA supply developed RA thrombosis. Of the 9 patients with FL supply to the CA, one developed celiac dilatation and one developed celiac stenosis. Three patients developed stenosis or dilatation in branch vessels supplied by the TL. 24 of the 39 patients demonstrated aortic dilatation in follow-up imaging.

Conclusions: In the majority of cases of aortic dissections, at least one of the visceral or renal vessels is supplied by the FL. The most common pattern of abdominal branch vessel involvement is single RA perfusion by the FL with TL supply to the remaining vessels. Most commonly the RA's arise from different lumens, while the SMA and CA are most often perfused by the same lumen.

Comparison of knowledge and attitudes of primary care physicians towards Abdominal Aortic Aneurysm Screening in Canada and Ireland

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Objectives: The purpose of this study was to evaluate the knowledge and attitudes of primary care physicians (PCP) with regards to abdominal aortic aneurysm (AAA) screening in major urban centres in Canada and Ireland. Both countries have AAA screening guidelines that have been promoted by their national vascular society but have no local or national strategy for implementation of the guidelines.

Methods: Standardized structured paper surveys were distributed to 1600 primary care practitioners in a defined geographic area in both Canada and Ireland. Participation was voluntary, and results were stripped of any identifiers prior to analysis. Analysis was conducted using SPSS and descriptive statistics. The process was approved by research ethics boards.
Results: Overall, 42.6% of invited participants responded. Less than 40% of physicians worked in an academic setting and 46 – 56 % have been in practice for more than 20 years. There was a vascular surgeon available at either their hospital or at the closest hospital to their practice for 70 – 78%. 56% see more than 12 men over the age of 65 per week in their practice. 30 % screen for AAA by physical exam although they agree that this is a poor modality. Only 40% were aware of AAA screening guidelines; of these, only 10% routinely screen by ultrasound and 5% actively screened target patients according to the guidelines. The majority agree with the importance of screening for hypertension and a variety of cancers; they did not recognize specific patient or resource barriers to AAA screening. Focused discussions with a subset of respondents revealed that PCPs preferred active advocacy by consultant vascular specialists to promote AAA screening.

Conclusions: Promotion of guidelines by a national vascular society does not correlate with an increased knowledge of guidelines or consistent practice for screening of AAAs amongst primary care physicians. PCPs support of the principle of screening in general and no specific barriers to screening were identified. Further studies are necessary to determine more vigorous strategies for widespread implementation of the AAA screening guidelines.

Vascular Graft Infections: A Single Center Review

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Objective: Vascular graft infections (VGIs) are rare but devastating complications of vascular surgery. The optimal surgical management remains controversial. Our aim was to review the local operative management of VGIs and specifically highlight the results of using the superficial femoral vein (SFV) as a replacement conduit in the setting of aortic graft infection (AGI).

Methods: A retrospective review of patients with a diagnosis of VGI who underwent operative intervention at our institution was conducted from April 2004 to June 2010. Charts were identified using ICD-10 codes. We included infections of aortic, cross-femoral and axillary-femoral bypass grafts. Data collected from the charts included mortality, length of hospital stay, ICU admission, peri-operative complications, amputation, in-hospital mortality, follow-up patency, and need for revision. The major endpoints were graft patency, limb loss and in-hospital death.

Results: A total of 34 patients who underwent operative intervention for VGIs were reviewed; 10 cross-femoral, 16 aortic and 8 axillary-femoral graft infections. All cross-femoral graft infections were replaced with vein graft (basilic or SFV). Eighty-eight percent (7 grafts) were patent on follow-up. There was one in-hospital death and no amputations in this group. Of the patients with AGIs, 9 were managed with excision and in-line reconstruction using SFV and 7 with excision and extra-anatomic bypass using prosthetic graft. Of those seen in follow-up, all of those with SFV reconstruction were patent compared with only 2/3 of those with extra-anatomic bypass. Similarly, excision and SFV reconstruction was associated with a lower in-hospital mortality rate; 11% (one patient) vs. 50% (4 patients) in those who had undergone excision and extra-anatomic bypass. There was no difference in the amputation rate.

Conclusions: Review of literature reveals that the approach to VGIs is evolving. Our results with femoral vein reconstruction are encouraging, with acceptable mortality, morbidity and good long term patency when compared to alternatives approaches.

Technical Factors Are Strongest Predictors of Postoperative Renal Dysfunction Following Open Juxtarenal Aneurysm Repair

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Objective: Juxtarenal abdominal aortic aneurysms (AAA) are predominantly repaired using an open technique, requiring suprarenal clamping. We present a series of patients with juxtarenal AAA and analyze factors predictive of postoperative renal dysfunction.

Methods: Between March 2000 and September 2011, all patients in our prospectively maintained database undergoing juxtarenal AAA repair were evaluated for demographics, operative details, and in-hospital outcomes. Postoperative renal dysfunction was classified using the RIFLE criteria (GFR decrease >25%). The relationship between perioperative factors and postoperative renal dysfunction was explored using both univariate and multivariate analysis (logistic regression).

Results: Of 169 patients, 76 (45%) required clamping above one renal artery while 93 patients (55%) required clamping above both renal arteries. Mean renal ischemia time was 29.2 min (range 12-65 min). Twenty-seven patients (16%) underwent adjunctive renal procedures, while 19 patients(11.3%) required left renal vein division, and 130 patients(76.9%) received mannitol. Postoperative renal dysfunction occurred in 63 patients (37.3%), with the majority (69%) resolving during hospital stay, with 4.1% requiring post-operative dialysis. Patients developing postoperative renal dysfunction had significantly longer mean renal ischemia times (34.7 vs 25.9 mins, $p < 0.001$), a higher rate of bilateral suprarenal artery clamping (68.3% vs 47.2%, $p = 0.008$), higher rates of adjunctive renal procedures (26.7% vs 8.8%, $p = 0.002$), and higher rates of left renal vein division (20.6% vs 5.7%, $p = 0.003$). Logistic regression identified left renal vein division, ischemia time, and clamp position as the strongest predictors of renal dysfunction, while the use of mannitol seemed to be protective. Overall in-hospital mortality was 4.1% as compared to 10% among those with post-operative renal dysfunction.

Conclusions: Postoperative renal dysfunction occurred in 37.3% of patients following juxtarenal AAA repair. Technical factors including renal ischemia time, clamp position, and left renal vein division are the strongest predictors of renal dysfunction, while the use of mannitol is protective.

Type II endoleaks post EVAR: incidence, rate of aneurysm sac enlargement and success of endoleak treatment.

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Introduction: To evaluate the natural history of type II endoleaks in patients undergoing abdominal aortic aneurysm endovascular repair (EVAR). The relationship between type II endoleak, aneurysm sac enlargement and treatment of type II endoleaks was examined.

Methods: We retrospectively reviewed the medical records and imaging results of all patients having EVAR for AAA at two university teaching hospitals between 1999 and 2010. Presence of type II endoleak on follow up imaging, CT scan or ultrasound, was used to identify cases. Branched, fenestrated and ruptured abdominal aortic aneurysms were excluded from the dataset. Sac enlargement was defined as greater than 5 mm increase in maximal sac diameter. Treatment included open repair or endovascular with coils and/or glue.

Results: A total of 598 cases were examined. The mean follow up of the total group was 35.3 ± 70.4 months (range 0-149.9). Seventy-nine type II endoleaks were identified (incidence 13.2%). In follow-up of these cases a decrease in aneurysm sac was seen in 23 (29.1%), while 33 remained stable (41.8%), and 23 (29.1%) showed sac enlargement. Of the 23 type II endoleaks associated with increase in AAA diameter, 15 underwent treatment (65.2%), 8 had no treatment (34.8%). Spontaneous resolution occurred in 5 endoleaks (21.7%). In most cases treatment was by angiography and coiling. Treatment success rate was 80% with only 3 cases of residual endoleak post coiling. Two patients underwent open repair of their type II endoleaks (9.1%). One patient with a stable type II endoleak died of aneurysm rupture 51 months after undergoing EVAR.

Conclusion: Most type II endoleaks associated with an enlarging AAA sac can successfully be treated by endovascular techniques. Lifelong surveillance is warranted in all patients with type II endoleak post EVAR, even those with stable AA sac diameter.

Ultrasound for follow up of Endovascular aortic aneurysm repair: Is CT Necessary ?

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Introduction: Various protocols exist for patients undergoing Endovascular abdominal aortic aneurysm repair (EVAR). Follow up is necessary due to the incidence of delayed rupture despite repair. Most protocols use CT scans for this follow up as it is highly sensitive in detecting endoleaks. However, Recent studies have shown the harmful effects of repeated radiation exposure. Other studies have shown that ultrasound is not as effective at identifying endoleaks as are CT scans. Since 2008 we have instituted an ultrasound only follow up, with CT scans reserved for those patients found to have enlarging aneurysms, irrespective of the presence or absence of endoleak.

Methods: We conducted a retrospective review of a prospective database of patients undergoing elective EVAR's from 1998 to 2010. Evaluation of endoleaks, sac enlargement, secondary treatments and method of diagnostic imaging were reviewed. Mortality rates, secondary interventions and freedom from delayed rupture are reported.

Results: 239 patients undergoing EVAR were eligible. Thirty day mortality was 2.1%. Mean follow up was 32.2 months with a range of 1-149 months. 15 patients were lost to follow up for a 93.5% follow up rate. Type 2 endoleaks were identified in 27 patients (11.3%), 7 resolved spontaneously. Sac enlargement occurred in 10 of the 20 remaining sacs. Two aneurysm ruptures occurred, both in patients with enlarging aneurysms noted on follow up imaging.

Conclusions: Sac enlargement is a useful tool in determining the need for further interventions after EVAR. Ultrasound follow up of patients undergoing EVAR is effective in the determination of sac enlargement, irrespective of the presence or absence of endoleaks allowing for further interventions to reduce the incidence of post repair ruptures and thus reducing the patients exposures to harmful effects of radiation.

Trends in the utilization of endovascular therapy for elective and ruptured thoracic abdominal aortic aneurysm procedures across Canada.

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Objective: Randomized trials have shown improved operative mortality with Endovascular Aneurysm Repair (EVAR) and similar long-term mortality rates. There have not been any trials assessing the outcome of Thoracic Endovascular Aneurysm Repair (TEVAR) however enthusiasm for TEVAR continues to increase. The current knowledge of utilization rates of TEVAR in Canada is limited.

Methods: Patients who underwent non-ruptured (TAA) and ruptured TAA (RTAA) repair, by either open surgical repair (OSR) or TEVAR, in Canada were identified from hospital discharge abstract data. Trends in rates for OSR and TEVAR were calculated by province and by year, and standardized per 100000 persons over 65 years of age (per capita).

Results: Between April 2004 and March 2009, 613 TAA procedures were performed in Canada, either by OSR (n=327) or TEVAR (n=286). The proportion of all elective AAA procedures by TEVAR increased from 25.5% in 2005 to 61.7% in 2009, the highest current proportion of EVAR utilization in Ontario (76.1%) and the lowest in Manitoba (<5%). After standardization, the national rate of total procedures for TAA increased 25%, however this did not translate into a proportional decline in the rate of RTAAs as a result during the study period. However, regions, such as Manitoba, that underutilized TEVAR, demonstrated trends towards higher per capita rupture TAA rates compared to national average rates. Provincial variations in TEVAR use did not correlate with differences in co-morbidities.

Conclusion: Use of TEVAR in Canada for AAAs has increased in the past 5 years, with an increase in overall TAA procedure volumes. Compared to EVAR, there has been an earlier acceptance and a more rapid diffusion of TEVAR technology. Although the national rate of ruptured TAAs did not proportionally correlate with the significant rise in TEVAR utilization, provinces such as Manitoba, which underutilized TEVAR, demonstrated trends towards higher per capita rupture TAA rates compared to national average rates indicating a region which may also have the largest potential for future increased use of TEVAR.

Fenestrated Stent Graft Experience of Juxtarenal Abdominal Aortic Aneurysms at Two Teaching Hospitals in Vancouver, British Columbia

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Objective: To review the outcomes of fenestrated endovascular abdominal aortic aneurysm repairs using the Cook custom fenestrated endograft

Methods: All patients between January 2005 and Dec 2011 and with short-necked or juxtarenal AAA treated with a fenestrated endovascular aneurysm repair (FEVAR) at two tertiary center teaching hospitals were retrospectively reviewed.

Results: Twenty-five patients (23 male/2 female) with a mean age of 75 (S.D. 5.82) were included in the study. The thirty day mortality was 0%. A total of 69 fenestrations (44 renal artery, 19 SMA, 6 celiac artery) were required. There was a total of eight intraoperative complications with two type 1 endoleaks (one proximal and one distal), two type 3 endoleaks, and an unplanned occlusion of the right internal iliac artery. Two target vessels in separate patients (left renal artery, right renal artery) proved unable to be cannulated resulting in the occlusion of the left renal artery and a separate operation with brachial artery access to successfully cannulate and stent the right renal artery. One renal artery was perforated with a wire intraoperatively requiring coli embolization. The visceral vessel perfusion rate was 91% (63/69). The median follow-up time was 28.5 months (range 3-75 months). A total of twelve peri-operative complications were seen: five NSTEMI's, three episodes of worsening congestive heart failure, two instances of acute kidney injury responding to conservative therapy with intravenous fluid therapy, one incident of left limb occlusion at 20 days post-operatively treated with a femoral-femoral crossover graft, and one incident of bilateral groin wound infection treated with antibiotics. Three patients died during the follow-up period unrelated to their aneurysm. Four patients were lost to follow-up. Late complications were seen in five patients and included a recurrent type 1 endoleak requiring multiple interventions and eventual conversion to open repair with graft explantation.

Conclusions: Use of FEVAR for short-neck and juxtarenal abdominal aortic aneurysm repair appears safe with low morbidity and mortality in moderate volume centers.

Patency of the Contralateral Internal Iliac Artery in Aortouniliac Endografting
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Objective: To determine the outcome of the contralateral internal iliac artery (IIA) in patients undergoing endovascular abdominal aortic aneurysm repair (EVAR) with an aortouniiliac endograft and femorofemoral bypass.

Methods: This retrospective study evaluated 131 consecutive patients with abdominal aortic aneurysm treated with aortouniiliac EVAR and femorofemoral bypass at a single institution between October 2001 to November 2010. Following review of the medical records, 31 patients were excluded from the study due to: lack of IV contrast use on follow-up CT imaging (14), intentional preoperative/intraoperative coiling and/or coverage of the contralateral IIA (11), death within 24 hours of the surgery (2), absence of femorofemoral bypass (2), existing bypass of the femoral arteries (1) and immediate conversion of endovascular to open surgery (1). This left 100 patients for inclusion in the study. Preoperative demographics andpost-operative contrast-enhanced CT scanswith multiplanar reconstruction were reviewed for all patients. Contralateral IIA patency was determined intra-operatively following occluder deployment. The last available postoperative CT imaging for all patients was then identified and evaluated for contralateral IIA patency. Patency on imaging was defined as contrast enhancement of the IIA in continuity with the external iliac artery and absence of >50% stenosis at the origin of the IIA. If occlusion was identified on the last available follow-up CT scan, previous CT scans during the follow-up period were reviewed to determine duration of patency. Clinical outcome focused on postoperative pelvic ischemia and reported symptoms of buttock claudication.

Results: Median age at time of operation was 77.6 ±6.7 years; 78% were male. Median clinical follow-up was 24.3 months post-surgery and median follow-up of imaging with intravenous contrast was 21.7 months. 67 patients (67%) had a patent contralateral IIA on last imaging follow-up, while 33 patients (33%) had either occluded (25 patients, 76%) or stenotic (7 patients, 24%) internal iliac arteries. Preoperative demographics including diabetes, chronic renal insufficiency, dyslipidemia, CAD,

hypertension, COPD, age and gender were not significantly different between the two groups. Of the patients with IIA occlusion, 80% (20/25 patients) were found to have occluded on the first post-operative imaging (median 8.0 days). Buttock claudication was reported in 18% (6/33 patients) with occluded IIA compared to only 3% (2/67 patients) of patients with patent contralateral IIA on final imaging follow-up (18% vs. 3%; p=0.014). There were no observed cases of buttock necrosis, spinal ischemia or colonic ischemia.

Conclusions: Our findings suggest that aortouniiliac EVAR with femorofemoral bypass is associated with a significant incidence of contralateral IIA malperfusion on postoperative CT imaging. Occlusion appears to occur early in the postoperative period in the majority of patients and patient-reported buttock claudication is observed significantly more frequently in patients with occluded IIA compared with those with patent IIA. More serious pelvicischemic complications were not seen in this series. Further study is required to determine if modification of procedural conduct can prevent contralateral IIA occlusion and prevent the development of buttock claudication.

Prevalence and Significance of Extravascular Incidental Findings on Computed Tomographic Angiography and Magnetic Resonance Angiography

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Objective: Computed Tomographic Angiography (CTA) and Magnetic Resonance Angiography (MRA) are routinely used to evaluate patients with vascular disease. They have the ability to detect unexpected nonvascular pathology. The purpose of this study was to determine the prevalence and significance of extravascular incidental findings in patients undergoing CTA or MRA.

Materials and Methods: A retrospective review of 737 patients who underwent CTA and 184 patients who underwent MRA during a 5-year period was performed. Incidental findings were classified as low, moderate, or high significance findings. For patients with high significance extravascular findings, hospital records were reviewed to determine if appropriate follow up was conducted.

Results: Among the CTA patients, 539 (73.1%) had incidental findings. Low, moderate, and high significance findings were discovered in 514 (69.7%), 95 (12.9%), and 41 (5.6%) patients, respectively. 20 (48.8%) patients with high significance findings received appropriate follow-up investigations. Among the MRA patients, 95 (51.6%) had extravascular findings. Low, moderate, and high significance findings were present in 80 (43.5%), 27 (14.7%), and 3 (1.6%) patients, respectively. 2 (66.7%) patients with high significance findings were properly followed up.

Conclusion: Incidental extravascular findings on CTA and MRA are very common in patients with vascular disease. Although most of these findings are benign, a small percentage could be serious and were not all adequately followed-up in our study population. Referring physicians should arrange appropriate investigations for patients with potentially serious findings.

Alterations in Gravitational Mechanical Loading: Effects on Endothelial Cells

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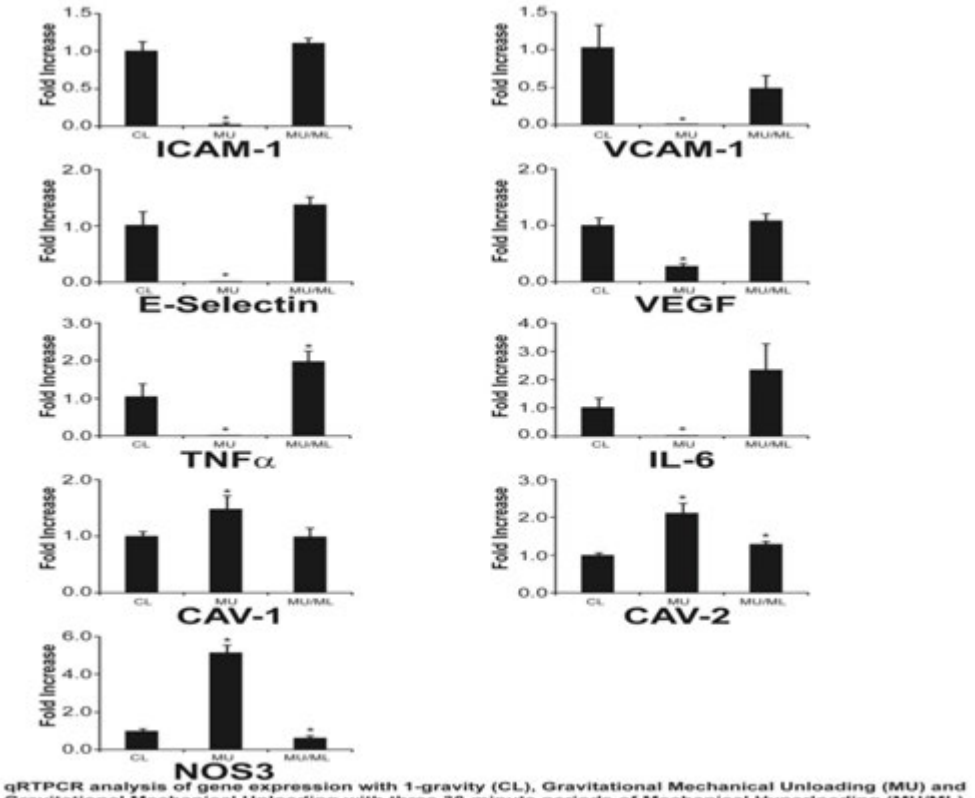
Objectives: Mechanical forces including gravity affect mechanotransduction and subsequent cell function. The goal of this study was to investigate the impact of mechanical unloading (MU) and loading (ML) of endothelial cells (ECs) with microgravity and hypergravity respectively, with the hypothesis that MU alters baseline expression of inflammatory and adhesion molecule gene expression and these changes are reversed by ML.

Methods: Human umbilical vascular endothelial cells (HUVECs) grown to confluency were studied. A desktop random positioning machine and a gravitational cell-loading apparatus provided MU and ML conditions, respectively. The experimental conditions included: 1) control exposed to 1-gravity environment for 24 h (CL), 2) MU for 24 hours, 3) MU for 24 hours with three 30-minutes periods of ML of 12-gravity (MU/ML). Gene expression was studied with qRTPCR and surface cell adhesion molecule with flow cytometry.

Results: MU led to a significant decrease in gene expression of the adhesion molecules ICAM-1, VCAM-1, E-Selectin, IL-6, TNF-α and VEGF. NOS-3, Caveolin-1 and -2 were significantly increased with MU. There was also a significant decrease in cell surface proteins ICAM-1, VCAM-1 and E-Selectin with MU seen on flow cytometry. The changes observed in gene expression with MU were reversed by gravitational mechanical loading (MU/ML).

Conclusions: Gravitational MU decreases inflammatory and adhesion molecule gene expression and these changes are reversed by short periods of ML. This points towards the importance of gravitational loading in mechanotransduction and warrants further investigations with regards to clinical significance.

FIGURE



qRTPCR analysis of gene expression with 1-gravity (CL), Gravitational Mechanical Unloading (MU) and Gravitational Mechanical Unloading with three 30-minute periods of Mechanical Hyperloading (MU/ML). "*" =p<0.05 compared to CL.

Radiation Dose Passport for Vascular Patients

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Background: Radiation safety has received widespread media attention and is now in the forefront of patient's minds as they go about their medical decision-making. Recently, the Radiation Passport was developed to allow tracking of ongoing medical radiation exposure, and estimate the associated cancer risk.[1]

Objective: To characterize the radiation exposure over time and the associated cancer risk in patients undergoing endovascular aneurysm repair (EVAR), using the application Radiation Passport.

Methods: We carried out a retrospective chart review of 54 consecutive patients who underwent EVAR at our institution in 2011. A Radiation Passport was created for each patient, including all medical radiation exposure they received from the time of their pre-operative imaging until 3-months and 6-months post-EVAR. The cumulative radiation dose acquired and the estimated associated cancer risk were calculated.

Results: 83.3% (n=45) of the patients were male with a mean age of 77 (±8.4, 52-90) at the time of surgery. 98.1% (n=53) were evaluated by CT scan pre-operatively and 1.9% (n=1) by MRA. 5.6% (n=3) required re-intervention within 3-months of EVAR and 7.4% (n=4) within 6-months. The mean cumulative radiation dose was 58.7 mSv (±19.4, 15.7-109.9) at 3-months and 59.8 mSv (±20.2, 15.7-110.7) at 6-months post-EVAR. The baseline risk of cancer caused by background radiation for this group was 1/46 (2.2±0.5%). This risk increased to 1/43 (2.3±0.5%) 3-months and 1/42 (2.4±0.5%) 6-months post-EVAR.

Conclusion: Radiation Passport or similar tools may start to be used by patients and families in their medical decision-making. The vascular surgery community should be aware that these tools exist and the type of information patients are gathering from them. Based on the advanced age of this subset of patients and the relatively minor increase in cancer risk perioperatively, abdominal aortic aneurysm patients should not be discouraged from undergoing EVAR based on concerns over radiation safety. influence 30 day stroke and mortality rates following carotid endarterectomy?

1. *Baerlocher MO, Talanow R, Baerlocher AF. Radiation Passport: An iPhone and iPod Touch Application to Track Radiation Dose and Estimate Associated Cancer Risks. Journal of the American College of Radiology. 2010;7(4):277-80.*

Where to DRIL: Finding the Best Inflow for the DRIL Procedure

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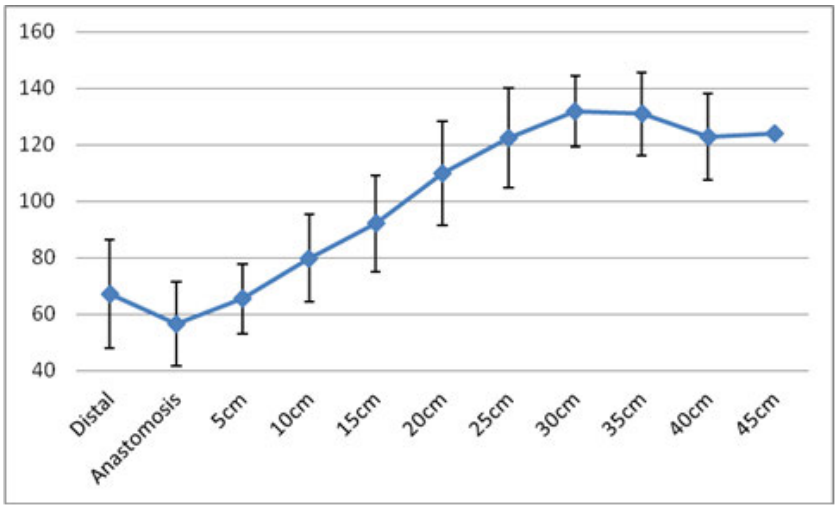
Introduction: The DRIL (Distal Revascularization – Interval Ligation) procedure is an effective method for treating ischemic steal syndrome caused by hemodialysis access. Uncertainty exists regarding the optimal placement of the proximal anastomosis for the DRIL bypass.

Methods: In the preceding five years, ten patients in the hemodialysis program of the Regina Qu'Appelle Health Region were evaluated as candidates for the DRIL procedure to treat ischemic steal caused by a brachiocephalic or brachiobasilic arteriovenous fistula. These patients underwent preoperative catheter angiography and arterial systolic, diastolic and mean pressures were obtained at five centimetre intervals from a point within the brachial artery five centimetres distal to the arterial anastomosis of the vascular access, to the subclavian artery.

Results: Mean systolic blood pressures (mmHg) with 95% confidence intervals are shown:



Conclusions: A zone of low pressure exists in the brachial artery near the arteriovenous anastomosis and central pressures are not reliably achieved until 20 cm proximal to the arteriovenous fistula. Optimal DRIL bypasses should originate at least 20 cm proximal to the arteriovenous fistula.

Superficial Vein Thrombosis in a Community Setting: the need for a management algorithm

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Superficial vein thrombosis (SVT) has been considered a 'minor' localized venous inflammation ('phlebitis'); however, studies have suggested that SVT is a deep vein thrombosis (DVT) equivalent and guidelines recommend anticoagulant therapy or close surveillance. The aim of this study was to document the natural history of SVT and its management using a defined algorithm.

Methods: Consecutive patients who presented with symptoms suggestive of SVT were identified by venous duplex ultrasound (VDU) to have SVT. All patients were admitted to a management algorithm. If no DVT was identified, the patients underwent a repeat VDU at 1 week and 1 and 3 months. If a patient was at high risk, showed SVT near junctions or DVT was identified, full anticoagulation was administered. All data was analyzed to identify the natural history of the SVT and factors predictive of DVT.

Results: In 14 months, 72 patients were found to have SVT by VDU; 8 had DVT at initial presentation. Risk factors included age, obesity, varicose veins, previous DVT or SVT, known malignancy and hypercoagulable state. SVT was localized (29), locally extensive (19), multilevel (16) and bilateral (8). Of the 64 patients with SVT only, progression occurred in 30 (1 week - 15, 1 month - 10 and 3 months – 5), resolution in 20 patients and no change in 14 on repeat VDU. 15 patients were treated with anticoagulation (DVT 9, near junction 5, for travel 1). Need for anticoagulation correlated with initial findings of extensive SVT, obesity, previous SVT or DVT and hypercoagulable state.

Conclusion: SVT is not a benign 'minor' condition; co-existent DVT is found in 11% and subsequent indication for anticoagulation in 22 %. Management of patients with SVT in an algorithm of anticoagulation or careful surveillance is appropriate and is consistent with guideline recommendations.

Safety of carotid endarterectomy without shunt

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Objectives: Stroke is a rare complication of carotid endarterectomy (CEA). The usefulness of carotid shunting during CEA has not been proven. Our aim is to assess the safety of routine non-shunting particularly in patients with contralateral carotid occlusion or recent stroke.

Methods: We retrospectively reviewed medical records of consecutive patients undergoing CEA by three vascular surgeons in the province of Quebec, selected because they had a practice of routine non-shunting. 95% confidence interval (CI) for 30-day stroke or death rates (SDR) were also calculated by the modified Wald method.

Results: 229 patients were treated from May 2008 to June 2012: 167 (73%) men and 62 (27%) women. The median age was 69 years old (43-94). 61 (26%) patients were asymptomatic, while 45 (20%) suffered from amaurosis fugax, 45 (20%) from transient ischemic attack and 78 (34%) from recent stroke. 34 (15%) and 30 (13%) patients had contralateral carotid stenosis between 50-69% and 70-99% respectively, while 16 (7%) had a contralateral carotid occlusion (CCO). 228 (99%) patients were operated under general anesthesia. All patients had a 30-day follow-up. Globally, 2 (0.8%) patient died and 4 (1.8%) suffered from stroke giving a SDR of 2.2% (5/229) with a 95% CI of 0.8 to 5.2%. Out of the 78 patients that had a recent stroke, 2 (2.6%) had a postoperative stroke giving a SDR of 2.6% (2/78) with a 95% CI of 0.2 to 9.4%. Regarding the 16 patients that had a CCO, 2 (12.5%) had a postoperative stroke giving a SDR of 12.5% (2/16) with a 95% CI of 2.2 to 37.3%.

Conclusion: Our results suggest that non-shunting during CEA, is a safe procedure for our patients. More patients are needed to confirm the safety of this practice in patients with contralateral occlusion or for those with recent preoperative stroke.

Vascular Quality of Care Assessment: How Admission to a Vascular Surgery Service Affects Evidence-Based Risk Factor Modification in Patients with Lower Extremity Peripheral Arterial Disease

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Objective: Peripheral arterial disease (PAD) guidelines recommend aggressive risk factor modification to improve cardiovascular outcomes in this patient population. Recommended pharmacologic therapy includes antiplatelets, angiotensin converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARB) and HMG-CoA-reductase inhibitors. The objective of this study was to determine whether admission to a Vascular Surgery Service improved rates of prescribing of these guideline recommended therapies on discharge.

Methods: A retrospective chart review of patients admitted to the Vascular Surgery Service at University Health Network from January 2010 through July 2010 was conducted. Inclusion in the study required a primary or secondary diagnosis of lower extremity PAD. Criteria were established by a multidisciplinary clinical team to determine eligibility for a risk reduction therapy. Patient demographics, comorbidities, and medications prior to admission were collected. Patients were assessed at discharge and deemed eligible to receive one of the recommended therapies according to the established criteria.

Results: 132 patients met inclusion criteria. The mean age of the patients was 71 years and 64% were male. Fifty percent of patients were emergency admissions. Prior to hospital admission, 64% of patients were on antiplatelet therapy, 73% were taking either an ACE inhibitor or an ARB, and 73% were taking an HMG-CoA-reductase inhibitor. At the time of discharge, 92% of eligible patients were prescribed at least one antiplatelet agent, 82% of eligible patients were prescribed ACE inhibitors or ARBs, and 83% of eligible patients were prescribed HMG-CoA reductase inhibitors.

Conclusion: The results of this study reveal that there is suboptimal prescription of risk reduction therapies in the community and this improves on admission to a Vascular Surgery Service. Although the proportion of patients receiving evidence-based treatments at discharge is high, there is still room for improvement in this high-risk group of patients. Strategies for increasing these rates are being explored.

Factors Related to Walking Performance in Claudicants

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Objective: To examine the associations in claudicants between Ankle-Brachial Index (ABI), diabetic status, current smoking, waist circumference (WC), self-reported exercise and walking performance, as measured by the Gardner graded progressive treadmill test.

Methods: Claudicants with an ABI ≤ 0.9, with claudication as the limiting factor in walking performance were invited to participate. Consenting participants completed a standardized graded treadmill test and an intake interview, which included a self-report history of current exercise activities. A 5 level

categorical scale was created based on increasing levels of exercise (0 = sedentary to 4 = greater than 4.5 hours of walking per week or at least 2 hours on a treadmill).

Results: 157 patients (46 female, 111 males) were tested, with a mean absolute claudication distance (ACD) time of 429.7 sec. There was no significant difference between sexes with respect to factors studied. Smokers were younger, had significantly lower ABI, WC, and performance and higher proportion of sedentary activity. Diabetics were more likely to have a larger WC and poorer performance but no difference in ABI, age or self-reported exercise. ACD was significantly different between the 5 categories of self-reported exercise ($F = 27.2$, $p < .001$); participants in the highest category (Level 4) performed better than all other categories. Sedentary participants performed similar to Levels 1-2 but different than Levels 3-4. In a multivariate linear regression analysis, male sex ($\beta = .14$, 95% CI 14.5,219.3), smoking status ($\beta = -.22$, 95% CI, -187.7,-60.7), diabetic status ($\beta = -.20$, 95% CI-301.7, -70.8) and self-reported exercise ($\beta = .56$, 95% CI 116.8, 185.2), but not age, WC or ABI were associated with walking performance ($F = 20.2$, $p < .001$)

Conclusions: Factors related to claudication performance that can be modified include smoking and exercise participation, with exercise being the most important factor. Our results suggest that a significant duration of regular walking exercise (i.e., ≥ 3.5 hours per week and/or treadmill) is needed to effect walking performance.

Prediction of Limb salvage after arterial reconstruction for mangled extremities

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Background: Over the past 2 decades, few guidelines have been available for the decision-making process of primary amputation for mangled extremity. These guidelines were based on application of severity grading systems. However, these systems derived from retrospective data and a small number of patients. The aim of this study is to assess these scores for prediction of limb salvage after arterial reconstruction for mangled extremity.

Methods: Between August 2003 and August 2011, a prospective study on all patients with arterial injuries in mangled extremity was undertaken. All patients were scored using the Mangled Extremity Severity Score (MESS) and the Mangled Extremity Severity Index (MESI).

Results: During the study period, arterial reconstruction was performed in 124 patients with mangled extremity. Primary patency, secondary patency and limb salvage were 81%, 85.5% and 93.5%, respectively. The only factor affecting limb salvage was the site of trauma (upper limb 100% v. lower limb 89%, $p = 0.08$). There was no significant effect related to the mechanism of trauma (blunt 90% v. stab 100, $p = 0.125$), MESS (< 7, 100% v. > 7, 91%, $p = 0.22$) and MESI (< 20, 100% v.> 20, 90.5%, $p = 0.154$).

Conclusion: Upper limb injuries were the least likely to lead to amputation. We recommend that all injuries, whatever their score, should be surgically explored before treatment decisions are made

TCOM Study - Transcutaneous oximetry as a prediction tool for chronic wound and amputation healing outcomes

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Background: Researchers have proposed transcutaneous oximetry ($TcPO_2$) as a method to predict non-healing of chronic wounds and the occurrence of healing complications for lower limb amputations. There is, however, uncertainty regarding the optimal threshold value for $TcPO_2$ and its ability to independently predict these outcomes.

Methods: We undertook two systematic reviews and meta-analyses, searching five major medical databases, relevant review articles and reference lists. We selected all studies that evaluated $TcPO_2$ for its ability to healing complications of chronic wounds or lower limb amputations and conducted data abstraction independently and in duplicate. Results were pooled using the DerSimonian and Laird random-effects model.

Results: In the first review, four studies, enrolling 901 patients with 910 lower extremity chronic wounds demonstrated that a peri-wound $TcPO_2$ level below a cutoff of 20mmHg or 30mmHg was an independent predictor of chronic wound healing complications (OR 3.21, 95% CI 1.07-9.69). In the second review, fourteen prospective cohort studies, enrolling 626 patients with 658 amputations, reported data that allowed for the calculation of an unadjusted relative risk of amputation revision associated with a $TcPO_2$ level below cutoffs of 10mmHg (1.80; 95% CI 1.19-2.72), 20mmHg (1.75; 95% CI 1.27-2.40), 30mmHg (1.41; 95% CI 1.22-1.62) and 40mmHg (1.24; 95% CI 1.13-1.35). It was not possible to evaluate $TcPO_2$ as an independent predictor of amputation healing complications due to an insufficient number of studies reporting risk-adjusted results.

Conclusions: The first review suggests that $TcPO_2$ measurements have independent prognostic value in predicting chronic wound complications and can provide clinicians with a means to assess these wounds. The second review revealed significant associations of low $TcPO_2$ levels with amputation healing complications, but highlighted the need for a large, sufficiently powered study to determine this tool's independent predictive ability and an appropriate threshold value. Based on these results, we recently began a multicentre observational study that aims to evaluate $TcPO_2$ and transcutaneous carbon dioxide in this context.

The Use of Reentry Devices Improves the Procedural Safety and Clinical Outcomes of Recanalization of Iliac Artery Occlusions

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Objectives: Our aim was to analyze the effect of reentry device use on outcomes of iliac artery chronic total occlusion (CTO) recanalization .

Methods: A retrospective review of patients with iliac artery CTO treated with subintimal angioplasty (SIA) from 2006 to 2011 was completed. We compared the outcomes of two groups: those procedures completed with versus those without reentry device.

Results: Of the 121 iliac artery CTOs that underwent SIA, 32 cases used a reentry device while 89 did not. For the entire cohort, the mean age was 65, male 45%, hypertension 76%, hyperlipidemia 71%, diabetes 36%, and CAD 56%. Indications for the procedure included claudication (60%) and critical limb ischemia (40%). The clinical profile and indications for intervention were not statistically different for the 2 groups. Combining TASC C&D lesions, the reentry device group had a trend toward a higher percentage of more advanced lesions compared to the non reentry device group (82% versus 66% p=0.07). Yet despite the more advanced lesions, the technical success rate was higher in the reentry device group (100% versus 77% p=0.002). Combined major complication rate, retrograde aortic dissection, and 30-day mortality rate of the reentry group was also reduced (0% versus 10% p=0.04). Lastly, the 1, 2 and 3 years primary and secondary patency rates appear to be improved with the use of reentry devices; primary

patency at 1, 2, and 3 years for the reentry device group versus the non reentry device group (100%, 100%, 100% versus 84%, 72%, 64% p=0.02), and secondary patency at 1, 2, and 3 years for the reentry device group versus the non reentry device group (100%, 100%, 100% versus 93%, 91%, 77% p=0.125).

Conclusions: The routine use of reentry devices further improves the technical success, safety, and primary patency of SIA recanalization of iliac artery CTO. CT scans on renal function post EVAR

Peripheral Arterial Disease and Vulnerability to Cardiovascular Events: Data from the Heart and Soul Study

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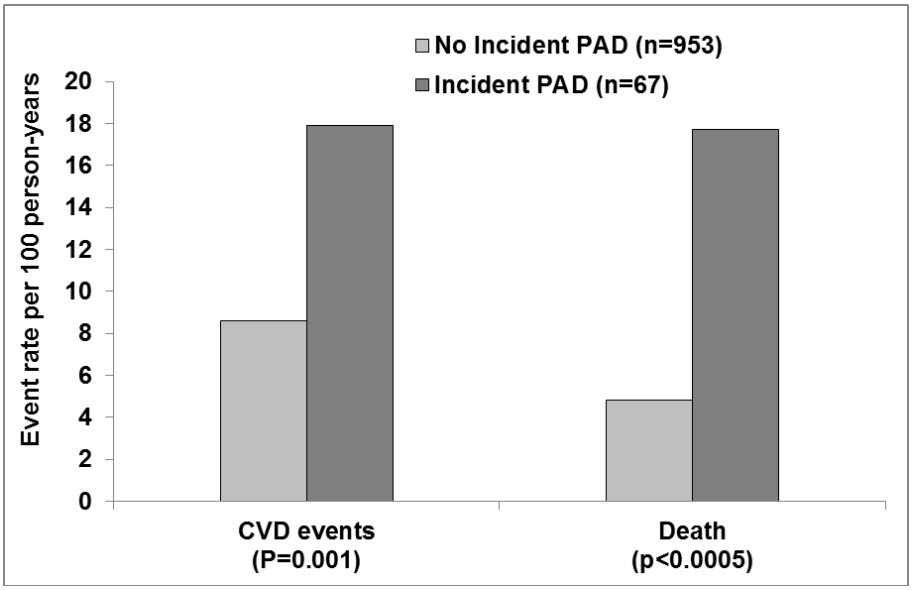
Objectives: Among patients with coronary artery disease (CAD), those with comorbid peripheral arterial disease (PAD) have a greater vulnerability to cardiovascular (CV) events than those with CAD alone. It is unclear why the presence of PAD predisposes patients with CAD to adverse CV outcomes. In a prospective cohort study of patients with CAD, we evaluated potential mechanisms that might explain the adverse CV outcomes associated with PAD.

Methods: We evaluated 1020 patients with stable CAD recruited from 2000-2002 and followed for an average of 7.2 ± 2.6 years. Incident PAD events were adjudicated based on physician diagnosis, radiological imaging and/or need for PAD surgery. We used Cox proportional hazards models to evaluate the association between PAD events and subsequent risk of CV events or death. Models were adjusted for traditional cardiovascular risk factors and a history of PAD at baseline.

Results: Among the 1020 patients, 67 patients developed incident PAD events during the follow-up period. Patients who developed PAD events had a higher risk of subsequent CV events and death compared to those who did not develop PAD (Figure). After adjustment for traditional cardiovascular risk factors and self-reported history of PAD, development of PAD events remained associated with an 84% increased risk of subsequent cardiovascular events [adjusted HR 1.84, 95% CI 1.15, 2.96, p=0.01] and an 89% increased risk of death [adjusted HR 1.89, 95% CI 1.30-2.74, p=0.0009]. Only a small portion of this association was explained by baseline differences in levels of IL-6, TNF-alpha and fibrinogen.

Conclusions: In a contemporary cohort of patients with CAD, development of incident PAD was associated with adverse CV outcomes. The increased risk of CV events was not fully explained by shared risk factors or inflammation. Further research is necessary to understand how the presence of PAD increases risk of subsequent CV events.

FIGURE: Event Rates in Patients With or Without Peripheral Arterial Disease.



Saturday, September 29th, 2012
Paper Session V: Peripheral Vascular Disease II

Risk Factors for Premenopausal Peripheral Arterial Disease

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Objectives: Despite similar risk factors, women have lower prevalence of PAD in the premenopausal period compared with age-matched men. The prevalence of PAD increases from 3-4% up to 29% in women after menopause. By the 7th to 8th decades, the prevalence is comparable in men and women. Little is known about the factors that protect women from PAD prior to the onset of menopause. The purpose of the study was to retrospectively review the ABI and risk factor data in premenopausal (< 53 years of age) women referred for ABI testing in the province of Manitoba between 1993 and 2010.

Methods: In Manitoba, a province of 1.1 million, virtually all ABI tests are performed at two hospitals by trained technicians. Both sites also collect risk factor data. ABI were considered to be abnormal if less than 0.9. Risk factors included were smoking, coronary arterial disease, obesity, diabetes, hypertension, hypercholesteremia, cerebrovascular disease, and chronic renal failure.

Results: Between 1993 and 2010, 928 women under the age of 53 underwent ABI testing (4.2% of all women in the database). Of these, 260 had abnormal ABI (2.6%). Eighty-five percent were between the ages of 41-52 and 27.9% had critically low ABI. The most prevalent risk for premenopausal PAD in this population was current or former smoking (85%). In most cases multiple coexisting risk factors such as hypertension (57%), diabetes (55%), and hyperlipidemia (55%) were present; however, no risk factor other than smoking was present in 9.1% of women. In premenopausal non-smokers, PAD did not develop unless 3 or more risk factors were present.

Conclusions: The development of premenopausal PAD is unusual and does not develop without multiple combined risk factors. Current and former smoking was most associated with the development of premature PAD. ABI testing in premenopausal women without multiple combined risk factors, including smoking, is unlikely to be of value.

Association Between Depression and Peripheral Arterial Disease: Insights from the Heart and Soul Study

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Objectives: Risk factors for peripheral artery disease (PAD) are tightly linked to those for coronary artery disease (CAD). Depression is known to increase the risk of CAD, but few studies have evaluated the association between depression and PAD. We examined the association of depression with PAD, and evaluated potential mediators of this association.

Methods: We used data from the Heart and Soul Study, a prospective cohort of 1,024 men and women with CAD recruited in 2000-2002 and followed for a mean of 7.2 $\pm$ 2.6 years with <1% annual loss to follow-up. Depressive symptoms were assessed with the validated nine-item Patient Health Questionnaire (PHQ). Prevalent PAD at baseline was determined by self-report. Prospective PAD events were adjudicated based on review of medical records (including physician diagnosis, radiological imaging and/or need for PAD surgery). We used logistic regression and Cox proportional hazards models to estimate the independent associations of depression with prevalent PAD and subsequent PAD events, adjusting for potential mediators of these associations.

Results: At baseline, 199 patients (19%) had depressive symptoms (PHQ≥10). Prevalent PAD was reported by 12% of patients with depression and 7% of those without depression (age-adjusted OR 1.80, 95% CI 1.06-3.06, p=0.03). During follow-up, PAD events occurred in 9% of patients with depression and 6% of those without depression (age-adjusted HR 1.78, 95% CI 1.03-3.08, p=0.04). Factors explaining more than 5% of the association between depression and incident PAD events included race/ethnicity, diabetes, congestive heart failure, HDL, triglyceride levels, serum creatinine, inflammation, smoking and levels of physical activity.

Conclusions: Depressive symptoms were associated with a greater risk of PAD. Since elevations in traditional, modifiable cardiovascular risk factors partially explain the association between depression and PAD, it is possible that more aggressive treatment of these risk factors could eliminate the association between depression and PAD.

Early Experience With Simultaneous Hybrid Revascularization for Co-existent Iliofemoral and Infrainguinal Occlusive Disease

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Objective: Many patients presenting with critical limb ischemia require extensive revascularization for multi-level arterial occlusive disease. We describe our early experience in treating such patients with a simultaneous hybrid approach and present relevant short term outcome data.

Methods*:* Between August 2010 and March 2012, all patients undergoing simultaneous hybrid revascularization for co-existent iliofemoral and infrainguinal occlusive disease were retrospectively reviewed for demographics, operative details, peri-operative complications, and short-term outcomes. Patients were only included if their original operative procedure involved femoral endarterectomy, iliac balloon angioplasty +/- stenting, and infra-inguinal revascularization (open or endovascular).

Results: 13 patients (fourteen limbs) met the stated inclusion criteria. Patients presented with ischemic rest pain (Rutherford Class 4, n=1), ulceration (Rutherford Class 5, n=3), or gangrene (Rutherford Class 6, n=10). Following hybrid iliofemoral reconstruction, open infrainguinal bypass was undertaken in 12 cases (11 autogenous, 1 synthetic) and endovascular therapy was utilized in 2 cases. Concurrent digital or forefoot amputations were performed in 7 cases.
Over a mean follow-up of 3.1 months (range 1 – 10.4 months), 2 patients required below-knee amputations due to progressive infection (despite clinically patent infrainguinal bypasses). Both patients were diabetics with pre-operative digital or forefoot ulceration/gangrene. One additional patient required a femoral-femoral artery bypass to treat an iliac occlusion (infrainguinal bypass remained patent) resulting in 100 % primary assisted patency. Overall limb salvage was 86 % and there were no in-hospital deaths.

Conclusions: Hybrid revascularization is highly effective in restoring arterial circulation in patients with severe critical limb ischemia secondary to multi-level arterial occlusive disease. In our early experience, limb loss occurred secondary to progressive infection rather than failure of revascularization.

A Prospective, Randomized, Crossover Observational Study Comparing Medical Student's Ultrasound Guided Technique Vs A Novel Real Time Needle Guidance Ultrasound Technique For Vascular Access Using A Phantom Gel Model

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Objective: To compare traditional ultrasound guided vascular access with a novel technique using an ultrasound with a needle guidance positioning system (nGPS) for both in-plane and out-of-plane techniques and to assess student perception of each task using the validated NASA Task Load Index questionnaire.

Methods: A prospective, randomized crossover study of medical students was conducted using a phantom gel model. Each student performed three ultrasound guided punctures with each of the four modalities (in-plane no nGPS, in-plane with nGPS, out-of-plane no nGPS, out-of-plane with nGPS) for a total of twelve attempts. A post-study validated NASA-TLX task load index questionnaire was conducted to assess the students 'perceptions of the two different techniques.

Results: Thirty students completed the study with a total of 90 attempts with each modality. A higher success rate for vascular access using the nGPS for both the in-plane (94% vs 91%) and the out-of-plane (86% vs 70%) views was observed but this did not reach statistical significance. The students perceived their ability to access vessels increased with the aid of the nGPS (6.83 vs 5.77, P = 0.007) with a higher performance satisfaction score(mean 14.5 vs 13.2, P = 0.041) The students perceived the mental demand (mean 11.0 vs. 13.3 , P = 0.035) and effort (mean 11.1 vs 13.1, P = 0.044) to be lower for the nGPS vs the traditional ultrasound guided technique. If given a choice students would overwhelmingly use the nGPS (26/30, 87%) as opposed to the traditional counterpart.

Conclusions: The use of precision ultrasound nGPS did not significantly improve success rate of vascular puncture compared to the traditional ultrasound guided technique. However, the assessment of mental task load strongly favours the use of the nGPS over the traditional two dimension technique.

National EVAR Fluoroscopy Times study

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Objectives: Radiation exposure is becoming an important topic for vascular surgeons as an increasing number of vascular diseases can be and are being treated by endovascular means. The most common of these is EVAR. Total fluoroscopy time has been shown to be a a good estimate of total radiation exposure. Surprisingly, there are no studies or guidelines indicating what should be a target fluoroscopy time for EVAR procedures. We look to tabulate a large number of radiation fluoroscopy times from a variety of centres across Canada in order to ascertain what are the national fluoroscopy trends for "typical" infra-renal AAA. This data will enable us to determine what are appropriate and safe fluoroscopy times in order to limit radiation exposure for surgeons, nurses and patients.

Methods: This is a national retrospective study involving large volume EVAR centres. We reviewed all EVAR procedures performed between 2008-2011. The inclusion criteria were infra-renal AAA of any diameter. Exclusion criteria were any involvement of renal arteries,TEVAR, fenestrated or branched

grafts. We looked at fluoroscopy times as indicated by the radiology or operative report. We also examined complications ranging from endoleak, migration, dissection, stenosis and occlusion. A questionnaire about surgeon practice was also forwarded to all surgeons who participated in the study

Results: Over 2000 EVARs were performed between 2008-2011 at the centres involved. Of these just under 1000 EVARs met our inclusion/exclusion criteria
The average fluoroscopy time was less than 8 minutes, and the complication rate of the procedure was equal to that indicated in the literature. Type 2 followed by type 1 endoleaks were the most common. The fluoroscopy time was slightly higher in EVARs performed percutaneously compared to cut-down. There was no correlation between shorter fluoroscopy time and complication rate.

Conclusions: Fluoroscopy can be used as a rough estimator of overall radiation exposure. In an era where vascular surgeons will be performing increasing numbers of endoscopic procedures and training younger surgeons to do so, it is important to limit their exposure. This is the first study of it's kind looking at national trends in fluoroscopy times, illustrating that "typical" EVARs can be performed safely well under 8 minutes and often under 5. This knowledge can help generate a worthwhile discussion regarding techniques and approaches to limit radiation exposure.

Preparation and Biocompatibility Assessment of Woven Silk Fibroin and Polyester (PET) Small Diameter Vascular Prostheses

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Introduction: Thrombosis remains the main cause of clinical failure for small diameter vascular prostheses. To date, *in situ* endothelialization of grafts and regeneration of blood vessels seems to be the ideal therapy for repairing diseased and injured arteries. Therefore the major clinical goal is to prepare a vascular graft with satisfactory mechanical performance, significant antithrombotic properties and the ability to promote endothelialization.

Ojective: To fabricate silk fibroin/polyester (PET) small diameter vascular prostheses and characterize their architecture and mechanical properties, as well as their cyto- and hemocompatibility.

Materials & Methods: Prostheses were woven on a 20 shaft narrow shuttle loom using silk fibroin (*bombyx mori*) and PET multifilament and monofilament yarns. The mechanical properties, thickness and water permeability were measured with universal textile tester, thickness tester and water permeability device. MTT assay was used to evaluate the viability and proliferation of endothelial cells on the graft materials. Rabbit vein blood was used for measuring the hemolysis and thrombus formation. Commercial prostheses and tissue culture plate were used as the control.

Results: The brioin/PET woven grafts were ivory in color, soft, flexible, and elastic in both radial and longitudinal directions. The range of inner diameters and wall thicknesses were 3.8-6.0 mm and 0.104-0.285 mm respectively, with water permeability of 21-470 ml/min.cm^2. The mechanical properties were significantly stronger than those of native blood vessels. The grafts supported EC proliferation, erythrocyte integrity, and showed a significantly improved anti-thrombotic performance compared to the commercial control.

Conclusion: The fibroin/PET small diameter prototype arterial prostheses showed good mechanical properties and superior cyto- and hemocompatibility. Implantation as carotid artery by-passes in pigs are in progress to validate the patency and the regeneration of a viable blood conduit.

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Fatigability of stent-graft woven fabrics with zig-zag versus ringed stents

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Aortic stent-grafts have gained a broad clinical acceptability throughout the past decades. However the frequency of graft related adverse events mandates close follow-up. Our ongoing international retrieval program has identified damage of graft fabric caused by contacting apexes of zig-zag stent.

Objective: To identify the most optimal configuration of the metallic supports using an *in vitro* fatigue/buckling machine.

Materials and Methods: The machine developed at the College of Textiles, Donghua University, permitted accelerated buckling of 200 cycles/min under a pressure of 360 mmHg. The tests were in duplicate and scheduled for 8, 24, 48 and 168 hours or stopped when holes were observed. We manufactured stent-grafts with a 10 mm diameter and a 100 mm length of woven polyester conduit. Three Nitinol zig-zag stents were sutured externally at 35 degree angle. Each stent required 13 stitches of 5-0 polyester suture. Anaconda stent grafts were used as controls.

Results: Three test devices ruptured after 16, 19 and 20 hours respectively. After 48 hours of cycling, broken sutures were observed on the Anaconda control devices. Abrasion caused by the rings was visible. Most of the sutures broken following 168 hour cycling with stitch holes enlarged.

Discussion and Conclusion: The degree of resistance to progressive, localized damage that occurs when the woven polyester fabric stent grafts are subjected to cyclic bending and folding is a good indicator to compare the fatigue life of various devices. Damage is cumulative and begins with dislocation due to movement and persistent slips. This is followed by microperforations and small holes which lead to major ruptures. These results suggest that suturing metal stents to fabric conduits represent an Achilles' heel of these devices. In order to develop a new generation of long-term durability, the issue of fatigue life of aortic stent grafts must be further addressed.

Sparking interest: Why medical students choose vascular surgery as a career

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Objective: The first Canadian 0+5 integrated vascular surgery (VS) residency programs begin July 2012. Growing interest in this training pathway emphasizes the need to understand the demographics and

motivating factors of the first 0+5 vascular residents and the qualities that made them successful in securing residency positions.

Methods: An anonymous, web-based survey devised by Lee et. al (2010) was administered to the incoming 0+5 VS residents from English-speaking Canadian programs with a 100% response rate. The survey assessed the background, personal experience, prior exposure to VS and motivations for residency specialty selection.

The Canadian Program Director Survey devised by Wagoner and Suriano (1999) was administered to PDs and selection committee members from English-speaking Canadian 0+5 integrated VS residency programs in an anonymous, web-based format with a 71% response rate. The survey assessed importance of electives, reference letters, research, applicant information, personal attributes, interview performance and academics.

Results: 100% of 0+5 VS residents had VS mentors, participated in research, are interested in academic surgery and spent a minimum of 1 month on VS rotations in medical school. The average age is 25 and 83% are male. Clinical rotations, mentors and endovascular technology were the top ranked reasons for choosing VS as a specialty. More focused training, interest in catheter-based therapies and research opportunities were the top ranked reasons for choosing the 0+5 training route.

PDs and selection committee members ranked electives at their centre with positive feedback, excellent reference letters from a recognized name in VS and multiple papers published in journals as having the strongest positive impact when assessing medical student applications.

Conclusion: Strategies to increase medical student exposure to VS through mentorship programs, increased clinical exposure to endovascular technologies and research programs will optimize the ability attract the best candidates to integrated 0+5 VS residency programs.

Patient Preferences for Location of Abdominal Aortic Aneurysm Surgery with Implications for Regionalization

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Objective: Elective repair of abdominal aortic aneurysms (AAA) has been centralized in higher-volume centres in Canada with reductions in postoperative mortality. The resulting increased travel distances may be undesirable to patients despite the mortality benefit. This study's purpose is to explore the strength of AAA patients' preference for local care versus longer travel distances and lower mortality rates.

Methods: Patients with AAA's between 4-5cm in diameter and living at least a one-hour drive from our university-affiliated hospital were surveyed using a modification of the standard gamble technique. They were asked to assume that their AAA had grown to 5.5cm and operative repair was recommended with a perioperative mortality risk at our centre of 2%. The level of additional operative mortality risk these patients would accept to undergo surgery locally, rather than at our regional center, was determined.

Results: To date, 44 patients have been surveyed, 93% live within a two-hour drive of our regional centre, and 95% within a 30-minute drive of their local hospital. The majority (77%) had been prior patients at our hospital. If perioperative mortality risk was equivalent at both their local and our regional hospital, 41% of patients would prefer care at the tertiary center and 50% of patients would prefer surgery locally. If perioperative mortality was increased, to any extent, at their local hospital, compared to our tertiary care center, only 9% of patients still preferred local surgery.

Conclusions: The vast majority of AAA patients will accept longer travel distances as long as it results in a reduction in perioperative mortality. In the absence of a survival advantage one half would prefer local care, although a large proportion would still prefer a longer travel distance and care at our centre. Such patient preferences should be considered when decisions regarding regionalization of services are made.

Analysis of fifteen years of wait time 1 and 2 data in Vascular Surgery at Kingston General Hospital 1996 – 2011

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Objective: The current health care environment is highly focused on quality of care within the dimension of timely access. Fifteen years of wait time 1 and 2 data was analyzed to evaluate practice methodologies and reasons that would mitigate meeting provincial targets.

Methods: Since 1996 the Division of Vascular Surgery has prospectively collected wait time 1 and 2 data for all elective referrals for outpatient clinic visits and scheduled surgery. Wait time 1 was measured against practice guidelines and pre- determined targets. Wait time 2 targets originally set in 1996 have been adjusted to meet current provincial and ministry targets.

Results: High risk disease groups (large AAA >6 cm; TIA; PVD with rest pain) were targeted to be seen within 7 days of referral to clinic. Wait time 1 for each at 15 years was within 4 days of target. Wait time 2 targets for high risk groups (large AAA and TIA) were challenged to meet average wait times and 90^{th} percentile wait times with average wait time 2 at ≥ 180 days and 90^{th} percentile wait time > 400 days. The more common reasons for delay included case substitution for a more urgent case for both

groups or unavailable intensive care for postoperative AAA's. Dramatic decreases in wait time 2 to provincial targets or better have occurred through aggressive office management.

Conclusions: Wait time management is a dynamic process. Wait time 1 management requires ongoing attention to practice guidelines and targets within the office booking visits. While wait time 2 in is part dependent upon hospital resources, there is an ongoing need for aggressive operating room booking management for case substitution to maintain utilization and hence wait time reduction.

Flared textile cuff to reinforce the proximal sealing zone of fenestrated stent-grafts

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Introduction: Fenestrated stent-grafts permit to extend the indications of AAA endovascular surgery in patients with severe limitations absence of docking zone and fragility. Currently the fenestrated devices are customized and the delays of fabrication (6-12 weeks) cannot be tolerated to treat emergencies.

Objective: To deploy a flared textile cuff to reinforce the proximal sealing zone in off-the-shelf stent-grafts.

Development of the flared cuffs: The cuffs were fabricated by compression molding. Polyester mutifilament yarns were sized and used as warp yarns to fabricate four prototypes of fabrics. We had 2 1/1 plain fabrics and 2 2/2 twill fabrics similar to that used in Anaconda and Cook devices, reppectively. The fabrics were compressed in a mould to obtain a flared structure after 10 minutes preheating at 160℃ in a hot air oven. Heat setting was completed at 160℃ for 30 minutes.

Results & Discussion: The cuff comprises a flat collar as base, an arc as curved section and a top as a regular fabric tube. The fabric count, density and thickness decrease from the first to the third section and the results vary with the different prototypes. The physical and mechanical properties of these flared fabric cuffs compare favorably with the commercially available woven fabrics.
It was therefore feasible to produce flared textile cuffs with a scope of properties better adapted to easier delivery and better adapted to tolerate various sizes of fenestration. Therefore it would become feasible to have a selection of off-the-shelf devices to satisfy the needs that previously requested customized devices.

Conclusion: The development of flared textile cuffs represents a considerable step forward: 1) it can be readily available off-the-shelf. 2) it permits adequate seal of the branches to the body of the stent-graft without any risk of blood leakage.

IVC Tumour Encasement: A Case Series and Review of the Literature

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Background: Inferior Vena Cava tumours can be classified as either primary or secondary. The operative management of these tumours can be challenging. The objective of this study is to perform a case review of patients who underwent operative resection of Renal (RCC) or Germ Cell Tumours (GCT) tumours with IVC encasement at a single institution.

Methods: A chart review was completed of 14 cases done. Related outcomes of the procedures and review of the literature will be reported.

Results: Operative resection was performed for GCT in 6 cases and for RCC in 8. There were no perioperative mortalities in this series. Major 30 day morbidity was relatively reduced, and included bowel resection, pneumonia, and ileus. Four patients had IVC invasion with tumour thrombus. One of these had such extensive disease, that she was closed and a palliative approach was taken. The other three all underwent primary closure of the caval defect. Literature review demonstrates caval ligation to be a safe and effective option in those patients with chronic IVC occlusion. For those with acute occlusion of their IVC, or those with significant preoperative symptoms due to their venous outflow obstruction, reconstructive options include using prosthetic or autologous conduits.

Conclusion: Patients who are deemed candidates for operative resection of their tumours with secondary IVC tumour involvement can be done with minimal operative morbidity and mortality. The majority of IVC defects can be repaired primarily, though ligation and IVC reconstruction are options.

An Ironman with Incapacitating Claudication: A Case Report

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A 62-year-old amateur triathlete, who had accumulated over 130,000 kilometers (km) of cycling, 20,000 km of running and many thousands km of swimming in the past 20 years, progressively became incapable of running. He presented with a severe claudication of the right buttock and thigh when running, although he did not complain of pain while cycling or swimming.

The physical exam revealed an athletic patient with a pulsatile mass in the right iliac fossa. The ankle-brachial index was normal at rest bilaterally. A computed-tomography angiogram showed an aneurysm of the right common iliac artery measuring 6.3 centimeters and an elongation of the external iliac arteries, more significant on the right than the left. Doppler ultrasonography did not reveal any stenosis of the arterial tree of the inferior extremities. Marfan, Ehlers-Danlos, and Loeys-Dietz syndromes were all excluded as possible causes for these anatomical anomalies.

The patient underwent a resection of his right common iliac artery aneurysm. The right external iliac artery was dissected minutely and unravelled. Therefore, it became possible to create an anastomosis between the aorta and the right external iliac artery. Doppler ultrasonography done in the recovery room showed a dissection of the right external iliac artery. A right aortofemoral bypass was immediately done using Dacron. The post-operatory period was without complications. The patient was able to start running again.

After having done a literature review on the subject, we believe that this case of a common iliac aneurysm associated with an elongation of the external iliac arteries, without an associated syndrome, is unique.

Elective Repair of Abdominal Aortic Aneurysm with Endovascular or Open Approach: Up to Date Meta-Analysis

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Background: the objective of this study is to provide an up-to-date meta-analysis on the short and long term mortality rates of elective repair of abdominal aortic aneurysms (AAA) via the open and endovascular approaches.

Methods: MEDLINE, EMBASE and Cochrane Central Register of Controlled trials, conference proceeding from major vascular meetings were searched for randomized trials comparing open versus EVAR elective repair of AAA. Relative risk (RR) and 95% confidence intervals (CIs) were calculated for short/long term mortality and re-intervention rates.

Results: The analysis encompassed 4 randomized controlled trials with a total of 2783 patients. The endovascular repair group resulted in reduced 30-day postoperative all-cause mortality when compared to open repair group *(1.15% vs. 3.2%; relative risk, 2.81 [CI, 1.60 to 4.94])*; however, there is no statistical difference in the long-term all-cause mortality between both groups *(25% vs. 24%; relative risk, 0.98 [CI, 0.86 to 1.10])*. Interestingly, more patients underwent re-intervention procedures in the endovascular repair compared to those who had open repair. (18.88% vs. 9.28%; relative risk, 0.49 [CI, 0.40 to 0.60]). Lastly, no statistical difference in long term long term mortality rates due to CVD, aneurysm related and stroke after EVAR or open repair of AAA.

Interpretation: Results of this meta-analysis demonstrate that the 30 day all caused mortality rate is higher with open than with EVAR repair; however, there is no statistical difference in the long term all cause mortality between both groups. The re-intervention rate due to procedural complication was higher in the EVAR group. Therefore, patients' surgical risk, co-morbidities and life expectancy should be considered in the treatment approach of elective repair of AAA.

Detailed Analysis of a Series of Explanted Talent AAA Stent-Grafts : Biocompatibility Issues

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Objective: The biocompatibility of explanted Talent stent-grafts from autopsy and reoperations was investigated to highlight the capacity of the fabric to act as a scaffold to regenerate a blood conduit whose flow surface could be blood compatible and capsules encroached in the fabric.

Method: The explants (one at autopsy and five at reoperations) were observed for gross morphology before and after dissection. The histology was investigated by scanning electron microscopy and light microscopy, after either paraffin or glycol methacrylate resin embedding and appropriate staining. This was followed by immunohistochemical analysis emphasizing the expression of fibrinolytic activators and their inhibitors.

Results: The device harvested at autopsy was encapsulated both internally and externally but the capsules were found detached and easily separated from the fabric wall. They were comprised of compacted fibrin without any connection through the wall. The luminal surface was smooth and glistening, immunohistochemistry showed some endothelial cells and the presence of smooth muscle cell α-actin. But it remained slightly thrombogenic. The devices harvested at reoperation had different degrees of internal encapsulation with discrete patches of compact fibrin and irregularly scattered mural thrombi, leaving the underneath fabric structures visible. Externally, no capsule was attached to the prosthetic wall and dispersed thrombi were presented.

Conclusion: The healing of the autopsy device was more evident. But in the absence of tissue encroaching through the wall, both internal and external capsules did not penetrate through the fabric structure. The smooth and glistening luminal surface showed the presence of some endothelial cells. The adverse events that required reoperation may have impaired both the biocompatibility and the biostability. However, the presence of a thrombotic matrix and/or blood debris was sufficient to guarantee the imperviousness of the fabric wall in the absence of significant fabric holes.

A National survey of elastic compression stockings prescription rates following diagnosis of deep venous thrombosis and patient perspective

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Objectives: The post thrombotic syndrome (PTS) is a chronic condition that develops in 20-50% of patients after deep venous thrombosis (DVT). It is characterized by chronic pain, swelling and may result in ulceration. Elastic compression stockings (ECS) can reduce the incidence and severity of PTS. The aim was to investigate practices and perceptions nationally of physicians regarding adjunct therapies to anticoagulation in patients with lover extremity DVT. In addition we wished to survey patient's perspective on ECS.

Methods: A nationwide survey was conducted of Canadian primary care staff (n=685) to investigate their attitudes towards prescription of ECS post diagnosis of DVT. Also a survey was randomly administered to patients diagnosed with a DVT attending a thrombosis clinic (n=58).

Results: The results demonstrated that the majority of staff physicians (58%) and residents (58%) were unsure whether ECS were effective in preventing PTS. This resulted in only 12% of staff physicians and 26% of residents routinely prescribing ECS for below-knee DVTs. Only 10% of staff physicians and 12% of residents prescribed ECS for above-knee DVTs. More than 70% of respondents were unsure about the optimal timing of initiation and duration of ECS. A majority of staff and resident respondents correctly predicted two out of the top three reasons for patient non-compliance (soreness and the need for assistance, but not cosmesis). 50% of DVT patients surveyed had ECS prescribed and 60% fulfilled the script. 69% wore them daily and all these patients (100%) reported that ECS relieved the swelling and symptoms.

Conclusions: Daily use of graduated ECS appears to reduce the risk of PTS and relieves patient's symptoms. There is a lack of consensus among medics regarding ECS use after DVT. There is a need for widespread education for patients and doctors regarding the latest evidence of the benefit of ECS after DVT.

Quality of Life Outcomes after Open versus Endovascular Abdominal Aortic Aneurysm Repair: Meta-analysis and Systematic Review

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Objectives: Endovascular repair of abdominal aortic aneurysms (EVAR) is a safe alternative to open aneurysm repair (OAR) in selected patients. The aim of this study was to compare the health-related quality of life (HR-QOL) outcomes of patients following EVAR and OAR.

Methods: A literature search of PubMed, EMBASE, and Cochrane Library identified five randomized controlled trials comparing HR-QOL in EVAR and OAR. No consistent HR-QOL instrument was used among the studies. A meta-analysis was performed on the SF-36 and the EuroQol-5D (EQ-5D) HR-QOL results.

Results: At 6 months, physical functioning was higher for OAR. At 12 months, social functioning was higher for OAR but general health perception was higher for EVAR (Table 1). SF-36 component summary scores were not statistically different. OAR was associated with a better EQ-5D score at 3 months (mean standard difference= -0.102, p=0.034).

Conclusions: OAR was associated with better HR-QOL in some domains up to 12 months. There is insufficient data to demonstrate a HR-QOL advantage beyond 12 months. More studies are required to examine any long-term HR-QOL advantages for either intervention.

	3 months		6 months		12 months	
Domain	**Std diff in means**	**P**	**Std diff in means**	**P**	**Std diff in means**	**P**
Body Pain	-0.024	0.856	-0.159	0.295	-0.274	0.102
General Health	0.435	0.001	0.335	0.029	0.371	0.015
Mental Health	-0.078	0.558	-0.202	0.182	-0.149	0.324
Physical Functioning	-0.237	0.075	-0.332	0.029	-0.267	0.077
Emotional Role Functioning	0.04	0.766	-0.093	0.540	-0.196	0.193
Physical Role Functioning	-0.134	0.315	-0.098	0.520	-0.147	0.329
Social Functioning	0.047	0.724	-0.061	0.688	-0.355	0.019
Vitality Score	-0.192	0.151	-0.147	0.333	-0.197	0.193

Table 1: Standard Difference in the Mean SF-36 Scores between EVAR and OAR at 3, 6, and 12 Months

Std diff in means= Standard difference in the means of open and endovascular aneurysm repair scores for individual SF-36 domains. A positive difference favours EVAR.

Abdominal aortic stent-grafts: from infancy to maturity

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Introduction: The utilization of aortic stent-grafts is the most significant innovation in the treatment of aneurysmal disease. First implemented by Kononov and Volodos in the former Soviet Union in the early 1980s, it later became widely adopted in the late 1980s after Parodi's successful human implantation.

Objective: To review retrieved stent-grafts.

Methods & Discussion: We have analyzed more than 50 explanted stent-grafts since the late 1990s from various manufacturers and have launched a systematic retrieval program in late 2010. The early concepts highlighted by the Stentor were physician driven and the adverse events were frequently related to poor designs and inadequate materials. Nitinol wires corroded rapidly, polypropylene sutures broke and the polyester weaves tore apart. During the first decade close attention was paid to the clinical results i.e. the biofunctionality. Progressively the material selection and the design issues were addressed, i.e. the biodurability, with Nitinol becoming much more resistant to corrosion. Due to the poor biocompatibility of current stent grafts, patients require yearly mandatory follow-up. The analyses of the explanted devices provided by surgeons in Canada and abroad have demonstrated a progressive decline in devices related adverse events, showing less material related failures after short-term implantation. However, the resistance of the graft fabric to abrasion requires further refinements. The supporting zig-zag stent designs remain a leading cause of fabric erosion. The number of adverse events related to an absence of biocompatibility and/or patients with more challenging anatomy are on the rise.

This lack of biocompatibility impairs the durability of the blood conduit and precludes the long-term patency. Devices harvested at reoperation show a highly thrombogenic luminal surface whereas similar devices obtained at autopsy after fatalities unrelated to graft failure demonstrate a more blood-compatible flow surface. Only when biocompatibility can be achieved, will stent-grafting be considered as a mature technology.

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