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VISFATIN, A NOVEL VISCERAL FAT PEPTIDE, CORRELATES WITH THE SEVERITY OF PERIPHERAL ARTERIAL DISEASE IN DIABETIC PATIENTS. *E. El-Eter, A. Al-Kayali, B. Al-Jabri, A. Al-Tuwaijiri, M. Al-Omran.* Department of Physiology and Division of Vascular Surgery, King Saud University, Riyadh, Saudi Arabia.

Background: Visfatin is a peptide that is highly expressed in visceral fat, was isolated as a secreted factor that promotes the growth of B-cell precursors and more recently was reported to act as an insulin mimetic factor. This study was undertaken to investigate the role of visfatin in the development of peripheral arterial disease (PAD) in diabetic patients. **Methods:** We prospectively collected data from 35 consecutive diabetic patients who were referred to the vascular surgery outpatient clinic at a tertiary care hospital for assessment of their PAD between January 2006 and March 2006. According to the patients' ankle brachial index (ABI), they were divided into 2 groups: group I had an ABI < 0.5, and group II had an ABI between 0.5 and 0.9. Fasting blood samples were collected for blood glucose (FBS), triglycerides (TG), total cholesterol, HbA_{1c} and plasma visfatin. Measurements of systolic and diastolic blood pressure and body mass index (BMI) were done. **Results:** The mean age for these patients was 57 years and 24% were women. No differences were detected between the 2 groups regarding FBS, TG, total cholesterol, HbA_{1c}, blood pressure and BMI. The plasma visfatin level in group I was 87.1 ng/mL compared with 63.1 ng/mL in group II ($p = 0.034$). The glucose:visfatin ratio was markedly lower in group I compared with group II (13.1 v. 17.9, $p = 0.04$). Furthermore, plasma visfatin level was negatively correlated with ABI ($p < 0.005$), suggesting its association with the severity of PAD. **Conclusions:** Visfatin probably plays a role in the pathophysiology of PAD regardless of the diabetic status. Whether the elevated plasma levels of visfatin in patients with PAD is a compensatory mechanism or initiative of the disease process needs further investigation.

SCREENING FOR ABDOMINAL AORTIC ANEURYSMS IN MEN: A CANADIAN PERSPECTIVE USING MONTE CARLO-BASED ESTIMATES. *B. Montreuil, J. Brophy.* Université de Montréal and McGill University, Montréal, Que.

Recently generated randomized screening trial data have provided good evidence in favour of routine screening for abdominal aortic aneurysm (AAA) to reduce AAA-related deaths in men aged 65 years and older. We developed an economic model that assessed the incremental cost-utility of AAA

screening to help decision makers judge the relevance of a national screening program in Canada.

We constructed a 14-health state Markov model comparing 2 cohorts of 65-year-old men, where one cohort was invited to attend screening for AAA using ultrasonography (U/S), and the other cohort followed the current practice of opportunistic detection. Lifetime outcomes included the life years gained, AAA rupture avoided, AAA-related mortality, quality-adjusted life years (QALYs) and costs. Transition probabilities were derived from a systematic review of the literature, and a probabilistic sensitivity analysis was carried out to examine the effect of joint uncertainty in the variables of our analysis. The perspective adopted was that of the health care provider.

Invitation to attend screening produced an undiscounted gain in life expectancy of 0.049 years and a gain in discounted quality-adjusted life years of 0.019 QALY for an estimated incremental lifetime cost of \$118. The estimated incremental cost-utility ratio was \$6194/QALY gained (95% confidence interval [CI] 1892–10 837). The number needed to invite to attend screening, and the number needed to screen (NNS) to prevent one AAA-related death were 187 (95% CI 130–292) and 137 (95% CI 85–213), respectively. The acceptability curve showed a greater than 95% probability of the program being cost effective, and the model was robust to changes in the values of key parameter within plausible range.

Our results support the economic viability of a national screening program for men reaching 65 years of age in Canada. More clinical studies are needed to define the role of screening in subgroups at high risk, especially in the female population.

IMPROVED SURVIVAL POST-INTRODUCTION OF EMERGENCY ENDOVASCULAR PROTOCOL FOR RUPTURED ABDOMINAL AORTIC ANEURYSMS. *R.D. Moore, M. Nutley, C. Cina, P. Farris, M. Motamedi.* Division of Vascular Surgery, and Centre for Health and Policy Studies, University of Calgary, Calgary, Alta.; Division of Vascular Surgery, McMaster University, Hamilton, Ont.

Purpose: To demonstrate improved 30-day mortality for patients following the introduction of an emergency endovascular therapy protocol for ruptured abdominal aortic aneurysms (rAAA). **Background:** In an effort to reduce the 40%–50% mortality rate of patients with rAAA treated with open repair, the field of vascular surgery has employed alternative techniques and innovations, including the use of endovascular repair (EVAR). Numerous authors have demonstrated significant reductions in both perioperative morbidity and mortality

using endovascular techniques. However, comparing open procedures with endovascular procedures before the introduction of an "intent-to-treat" endovascular protocol may be misleading. It is possible that patient cohorts before and after protocol introduction are dissimilar, particularly with respect to risk of death, and endovascular repair can never be applied to 100% of patients. It is therefore necessary to compare mortality in patient groups before and after implementation of a defined protocol. **Methods:** One-hundred and thirty-one consecutive surgical repairs of confirmed rAAA were evaluated to determine whether the introduction of an EVAR protocol impacted 30-day mortality. Seventy-five surgeries occurred before introducing the protocol (including 5 experimental EVAR), and 56 following introduction of the protocol (20 using EVAR). A novel EVAR algorithm was developed to determine the initial approach to diagnosis before treatment. We used logistic regression models to compare overall mortality for open versus endovascular repairs and pre-protocol versus post-protocol groups. These logistic regression models controlled for the effects of glomerular filtration rate (GFR) and systolic blood pressure (SBP). In addition, we used a highly sensitive risk-adjusted cumulative sum (CUSUM) chart to evaluate shifts in perioperative mortality following the protocol introduction. The risk-adjustment model for these charts used GFR and SBP from pre-protocol patients to predict 30-day mortality. This model had good discrimination (C-statistic = 0.84). **Results:** The odds ratio for endovascular repair from the logistic regression model comparing open to endovascular procedures was 0.078 ($\chi^2 = 7.798$, $p = 0.0052$) with 95% confidence interval [CI] 0.008–0.749. There is therefore statistical evidence that the mortality rate associated with endovascular procedures is lower than the mortality rate associated with open procedures. The odds ratio for the logistic regression model comparing all post-protocol procedures to pre-protocol procedures was 0.544 ($\chi^2 = 2.955$, $p = 0.0856$) with 95% CI 0.267–1.108, indicating a trend toward lower mortality for all patients post-protocol. The results of the risk-adjusted CUSUM chart for all repairs demonstrate a modest improvement in surgical performance following introduction of the protocol expected on the basis of the risk-adjustment model ($p = 0.074$). **Conclusion:** Employment of an EVAR protocol for management of patients in extremis with rAAA at a single institution has demonstrated a clinically important reduction in 30-day mortality. Given the improved mortality demonstrated for ruptured AAA EVAR repair, this trend toward improved surgical performance should continue as numbers increase. Patients with rAAA who are undergoing treatment in experienced vascular centres should be offered EVAR as the treatment of choice.

VASCULAR ACCESS: CAN WE OVERCOME THE OBSTACLES WITH A MULTIDISCIPLINARY PROGRAM? *R.S. Sidhu, J.D.S. Reid, P.S. MacDonald, J. Clement, R. Luscombe, M. Kiaii.* Divisions of Vascular Surgery, Interventional Radiology and Nephrology, University of British Columbia, St. Paul's Hospital, Vancouver, BC.

Background: A well functioning vascular access is an integral part of hemodialysis (HD) delivery. It is now well recognized that vascular access (VA) complications are one of the leading

causes of morbidity and mortality in HD patients. The Dialysis Outcome Quality Initiative (DOQI) guidelines recommend a VA distribution rate of 50% incident arteriovenous fistulae [AVF], 40% prevalent AVF and < 10% prevalent catheter for HD units. **Purpose:** The purpose of our study was to implement a multidisciplinary VA program in order to achieve the DOQI recommendations. **Methods:** The VA distribution rates of incidence and prevalence for AVF, AV grafts and catheters were assessed before and after implementation of a VA program. The program was implemented in 2002 at St. Paul's Hospital in Vancouver. It involves a dedicated multidisciplinary VA team composed of a dedicated nephrologist, a VA nurse, 3 vascular surgeons and 2 interventional radiologists. A regular VA clinic is attended by the nephrologist, the nurse and one of the surgeons. Patients who require a new vascular access creation or assessment of a dysfunctional vascular access are seen at the clinic. Patients who require access surgery are prioritized and placed on a common surgical waiting list for the first available elective VA surgery. Monthly vascular access rounds are conducted by the VA team to review access investigations and determine a treatment plan. The final component of the VA program involves routine monitoring of all AVF and arteriovenous grafts (AVG) which includes dynamic venous pressure monitoring and access flow measurements. A VA database was established and all data were entered prospectively by the VA unit clerk and nurse. **Results:** The VA distribution rates were analyzed in 2005 and compared with those before starting the VA program in 2001. The incident AVF rate increased from 12% to 38% ($p < 0.05$), the AVG rate remained low at < 10%, and the tunnelled cuffed catheter rate (TCC) decreased from 60% to 15% ($p < 0.05$). The prevalent AVF rate increased from 50% to 60% ($p < 0.05$), and the prevalent TCC rate decreased from 39% to 29% ($p < 0.05$). The median creatinine for patients who were not yet on dialysis at referral to VA clinic for access creation was 400 $\mu\text{M/L}$ (eGFR = 12 mL/min). The average surgical wait time for access creation from time seen in clinic was 24 days. **Conclusion:** As a result of the implementation of the VA program, our VA distribution rate improved significantly, reaching the DOQI recommendations for incident and prevalent AVF rate. Our tunnelled catheter rate did not achieve the DOQI recommendations. One of the identified obstacles for the high TCC was the late referral time for VA creation.

MAGNETIC RESONANCE IMAGING OF INTRAPLAQUE HEMORRHAGE (MRIPH): IN VIVO 3-DIMENSIONAL HIGH-RESOLUTION DETECTION OF CAROTID INTRAPLAQUE HEMORRHAGE. *R. Bitar, A.R. Moody, G. Leung, S. Symons, S. Crisp, C. Rowsell, J. Butany, D. Gladstone, D.J. Sahlas, A. Kiss, R. Muggisano.* Departments of Medical Imaging and of Laboratory Medicine and Pathobiology, University of Toronto; Departments of Medical Imaging, Neurology and Surgery, Regional Stroke Centre and Institute for Clinical Evaluative Sciences, Sunnybrook Health Sciences Centre; Department of Laboratory Medicine and Pathobiology, University Health Network, Toronto, Ont.

Background: Intraplaque hemorrhage (IPH) is increasingly being recognized as one of the markers that defines atherosclerotic plaques as being at increased risk of causing sympto-

matic disease, as well as being a potential stimulus for the progression of atherosclerosis. The purpose of this study was to develop a high-resolution isotropic 3-dimensional (3D) technique that exploits the T_1 -shortening effects of methemoglobin, directly visualizing IPH and therefore complicated atherosclerotic plaques (American Heart Association type VIb). **Methods:** Twenty-three patients undergoing carotid endarterectomy for symptomatic or asymptomatic carotid artery stenosis were imaged using magnetic resonance imaging of intraplaque hemorrhage (MRIPH). A total of 160 MRI images were acquired for each patient and were available for matching with the corresponding histology slices. A 16-segment template was used for MRIPH/histology correlation. Agreement between MRIPH and histology was measured by calculating Cohen's kappa. **Results:** A total of 455 segments were matched (each per modality). A high level of agreement was seen between MRIPH and histology (kappa = 0.71). The sensitivity, specificity, positive predictive value and negative predictive value were 73%, 93%, 85% and 87%, respectively. **Conclusion:** With its high spatial resolution, MRIPH allows in-slice detection of the location of hemorrhage in the plaque, resulting in a high level of agreement between imaging and histology. Being a 3D technique, MRIPH allows multiplanar reformations and provides a large number of images for analysis. These features of MRIPH could be useful to gain a better understanding of plaque pathophysiology and to monitor the effects of interventions on atherosclerotic plaques.

CONSTRUCT VALIDITY OF COMPUTER-ASSISTED ASSESSMENT: QUANTIFICATION OF MOVEMENT PROCESSES DURING A VASCULAR ANASTOMOSIS ON A LIVE PORCINE MODEL. *R. Brydges, R.S. Sidhu, J. Park, A. Dubrowski.* Departments of Surgery, University of Toronto, Ont., University of British Columbia, Vancouver, BC, and University of Manitoba, Winnipeg, Man.

Background: Complex surgical tasks can often be separated into smaller, more manageable fundamental skills for learning purposes. Basic surgical skills may be guided by the same motor program but will require small parameter adjustments to be performed correctly. Recognition of these changes in task complexity is important for development of criteria for competency testing. The purpose of this study was to determine if detailed hand-motion analysis can discern differences between the parachute and running suture vascular anastomosis techniques for both junior and senior trainees. **Methods:** Eighteen junior residents (PGY1-2) and 9 senior residents (PGY3 and higher) were tested on their ability to perform a vascular anastomosis on a live porcine model 1 week after a guided practice session. Two phases of 2 suturing techniques (parachute and running) were identified, and performance was evaluated during each phase using computer hand-motion analysis (CHMA) in addition to global rating scales and checklists. **Results:** Senior residents were more efficient on all segments based on CHMA and expert-based ratings ($p < 0.05$). The Imperial College Surgical Assessment Device (ICSAD) demonstrated a significant improvement in junior resident performance during the procedure (warm-up effect). Change in task difficulty during transition from parachute to running sutures was identifiable using CHMA. **Conclusions:** Different

suturing techniques are executed using the same general motor program, though specific program parameters are adjusted to suit each technique. The findings support a novel form of construct validity for CHMA, concept of transfer of skills and use of computer evaluations for assessment of technical skills imbedded within complex surgical tasks.

MULTIPLE MYCOTIC ANEURYSMS IN A PATIENT ON PERITONEAL DIALYSIS. *A.D. Dueck, T.F. Lindsay.* Division of Vascular Surgery, University of Toronto, Toronto, Ont.

A 38-year-old woman recently converted from peritoneal dialysis to hemodialysis presented with fever of unknown origin. Four months previously the patient was treated for *Aspergillus* peritonitis by intravenous antifungals and removal of the peritoneal dialysis cannula. Hemodialysis was initiated through a right internal jugular cannula, and a left arm fistula was created. The patient developed septic thrombophlebitis of the right internal jugular vein, which was treated with vancomycin and removal of the catheter. Despite repeated negative blood cultures, echocardiograms and initial CT scanning of the abdomen, the patient remained unwell with persistent fevers. She was admitted to hospital and, after a negative diagnostic laparoscopy, an MRI was performed to investigate increasing back pain. This revealed inflammation around the aorta and left iliac artery.

Subsequent CT scanning revealed a total of 6 aneurysms from the suprarenal aorta down to the iliac arteries, in the setting of clinical signs of ongoing sepsis. The largest aneurysm was in the left common iliac artery and measured over 3 cm in diameter, with evidence of enlargement when compared with CT scans performed several months earlier. After anti-staphylococcal and antifungal therapy were initiated, the patient was brought to the operating room and the entire abdominal aorta exposed from the level of the diaphragm to the external iliac level via a retroperitoneal approach. During the mobilization of the sigmoid colon an abscess 2 cm in diameter was entered, and cultures were taken. A rifampin-soaked dacron graft was attached to the visceral aortic segment to exclude an aneurysm adjacent to the left renal artery and the right renal artery. Distally it was attached to the right common iliac and the left external iliac artery. Postoperatively the patient made a slow but uneventful recovery. Antibiotic therapy and antifungal therapy were continued.

Mycotic aneurysms are rare and tend to occur in a variety of locations, which makes analysis of limited amounts of data problematic. In this report we discuss the practical implications of applying 2 sets of competing principles to the treatment of patients with mycotic aneurysms: use of a durable conduit (i.e., in situ reconstruction) versus the use of fresh tissue planes (i.e., extra-anatomic bypass), and rupture avoidance (i.e., early operation) versus sterility (i.e., prolonged preoperative antimicrobial therapy).

THE MODULAR STENT-GRAFT LATECBA: A NEW AND DIFFERENT CONCEPT. *R. Guidoin, M. Peirano, H.D. Barone, Y. Douville, Y. Mehri, Z. Zhang.* Université de Laval, Quebec City, Que.

Anchoring stent grafts to the host artery without any endoleak

and without any migration of the device is a key issue of endovascular deployment should the neck below the renal arteries be too short (i.e., less than 15 mm and greater than 5 mm) or severely angulated ($> 60^\circ$). A balloon expandable stent combined with a knitted prosthesis was designed for this undertaking and specifically to allow modelling of the stent to the neck anatomy without overdilatation, baro-trauma and better incorporation or healing of the device. The Latecba device is modular: the module A, to be deployed trans-renally, is made of a Palmaz-type stent attached to a crimped weft-knitted polyester graft. The module B is a non-crimped weft-knitted graft holding 2 stainless steel stents: the first one, which is totally inserted in the textile tube, permits the anchoring to module A; the second one, which is bare over its last half, guarantees anchoring the telescopic stent graft distally. Following the creation of a prosthetic aneurysm in the infra-renal aorta of 32 dogs, 29 dogs received the Latecba stent graft for scheduled durations of 10 days, 1 month, 3 months and 6 months. The deployment of the stent grafts did not present any difficulty. All 29 animals survived, and the devices were all patent at sacrifice. No device defect or migration was observed, and the stent grafts proved to be efficient in this setting to exclude the aneurysm. Analyses of the explanted devices (RX, IVUS, Faxitron, endoscopy) confirmed the stability of this modular stent graft. No infarct area was noted in the kidneys: embolization was therefore very unlikely. In conclusion, this concept seems to be attractive and with good behaviour of the device in dogs. The ongoing clinical investigations must validate this concept before this stent graft becomes available.

HEMODYNAMIC CHANGES AFTER PROXIMAL AORTIC ENDOVASCULAR STENT GRAFT INSERTION IN THE CANINE THORACIC AORTA. R.D. Moore, G. Dobson, J. Flewitt, J. Tyberg, C.R. Johnston, M. Karamanoglu. Departments of Surgery and Anesthesiology, Cardiac Sciences and Physiology and Biophysics, Mechanical Engineering and Biofluids, University of Calgary, and Medtronic Inc., Calgary, Alta.

Objectives: Endovascular stents are being used to treat aneurysms, dissections and acute traumatic disruptions of the thoracic aorta. The acute effects of such interventions on ventricular afterload and on pressure wave transmission characteristics are not well known. **Methods:** In 5 dogs, an endovascular stent graft was introduced into the descending aorta, just distal to the left subclavian artery, with oversizing of 20%. Following formaldehyde-induced complete heart block, the hearts were paced (30–120 beats/min). The ascending aortic pressures and flows were recorded using Millar micro-tip manometers and ultrasonic flowmeters, respectively. Arterial pressures proximal and distal to the stent site were also recorded. For each heart rate, parameters of a modified Windkessel (SVR = systemic vascular resistance; Z0 = characteristic impedance; C = total arterial compliance) were estimated. The pulse wave velocity (PWV) and reflection coefficient (Γ) were calculated from the pressure wave transfer functions. **Results:** The Z0 (0.25 ± 0.05 v. 0.41 ± 0.06 mm Hg/mL/s, $p < 0.05$) was increased and C was decreased (0.45 ± 0.07 v. 0.28 ± 0.04 , mL/mm Hg $p < 0.001$) following stent placement. SVR tended to increase ($p = 0.06$) and ascending aortic Γ was unchanged.

Hemodynamic parameters of the ascending aorta

Parameters	Group; mean (and standard error of the mean)	
	Control	Post-stent
Z0, mm Hg/mL/s	0.250 (0.052)	0.414 (0.061)*
Compliance, mL/mm Hg	0.446 (0.072)	0.276 (0.041)*
SVR, mm Hg/mL/s	5.8 (1.2)	7.7 (1.7)

* $p < 0.05$ versus control. P values from paired t test.
SVR = systemic vascular resistance; Z0 = characteristic impedance.

The PWV increased (418 ± 67 v. 755 ± 135 cm/s, $p < 0.05$) and the distal Γ decreased (0.09 ± 0.10 v. -0.49 ± 0.07 , $p < 0.05$).

Transmission characteristics of the descending aorta

Characteristics	Group; mean (and standard error of the mean)	
	Control	Post-stent
PWV, cm/s	418 (67)	755 (135)*
Reflection coefficient, Γ	0.09 (0.10)	-0.49 (0.07)*

* $p < 0.05$ versus control. P values from paired t test.
PWV = pulse wave velocity.

Conclusions: Endovascular stents in the proximal descending aorta cause unfavourable changes in the canine ascending aortic input impedance and an increase in the PWV through the stented segment, consistent with an increase in the modulus of elasticity. The stents produce a negative Γ at the distal end, an uncommon occurrence in the systemic circulation. Whether this change is of sufficient magnitude to result in post-stent dilation is unknown. The implantation of endovascular devices in the proximal descending aorta results in an increase in left ventricular afterload. The described changes following endovascular stenting may have long-term consequences in younger patients undergoing stenting for traumatic disruption of the aorta, in patients with coronary artery disease and in patients in whom left ventricular systolic reserve is reduced. Further human studies are required to characterize the hemodynamic consequences of stent implantation. Information regarding aortic wall endovascular stent graft interaction could be used to develop “compliance-matched” stents that may result in better long-term durability and more effective endovascular repair.

IN VIVO ANTEGRADE FENESTRATION (IVAF) OF AORTIC STENT GRAFT IN CANINE MODEL. L.W. Tse, B. Bui, S. Lerouge, I. Salazkine, A.J. Benko, G. Soulez. Division of Vascular Surgery, Peter Lougheed Centre, University of Calgary, Calgary, Alta.; Département de radiologie, CHUS Fleurimont, Université de Sherbrooke, Sherbrooke, Que.; Centre de Recherche du CHUM Hôpital Notre-Dame et Département de radiologie, Université de Montréal, Montréal, Que.

Objective: Currently the only options for endovascular treatment of abdominal aortic aneurysms (AAA) with inadequate proximal necks are custom pre-fabricated branched and fenestrated endografts. Fenestration of an endograft after it has

been placed in the aorta may allow more accurate placement of fenestrations without reliance on preoperative imaging and eliminate the long waiting period required to obtain a custom endograft. This would also allow an inventory of off-the-shelf endografts for both acute and elective juxtarenal aneurysms. The ultimate result would be lowered cost and increased availability of endovascular techniques to a larger proportion of patients. The goal of this study was to evaluate the feasibility of performing in vivo antegrade fenestration (IVAF) of a conventional aortic stent graft in a canine model. **Methods:** Aortic stent grafts were implanted in 2 canines with intentional coverage of both renal arteries. Prior to delivery, stents were deployed in the proximal portion of both renal arteries to allow fluoroscopic visualization of renal ostia. Perforation was performed with a Brockenbrough needle under fluoroscopic guidance. Fenestration was completed by balloon dilatation and bare stent insertion. Bloodwork and ultrasound were performed at one week, then repeat angiography and ultrasound were carried out before sacrifice at one month, followed by autopsy and biomaterials analysis of the explanted endografts. **Results:** IVAF was successful in one dog. Both renal arteries were patent, and intra-renal flow was normal on Doppler ultrasound and angiographic examinations performed one month after implantation. However, complete fracture of the left renal stent was observed. **Conclusions:** IVAF of aortic endografts is technically feasible. However, significant improvements in techniques, instrumentation and materials are required to make IVAF a reality.

RUPTURED ENDOVASCULAR ANEURYSM REPAIR: A SYSTEMATIC REVIEW AND META-ANALYSIS OF OBSERVATIONAL STUDIES. *T.M. Mastracci, C.S. Cina, C.M. Clase.* Departments of Surgery, Clinical Epidemiology and Biostatistics, and Medicine, McMaster University, Hamilton, Ont.

Background: The mortality of ruptured abdominal aortic aneurysm (rAAA) has not changed for 2 decades (Heller et al, *J Vasc Surg* 2000;32:1091-100). A previous meta-analysis of observational studies of conventional open repair of rAAA reported the perioperative mortality to be 48% (95% confidence interval [CI] 46–50) (Bown et al, *Br J Surg* 2002;89:714-30). Endovascular aneurysm repair (EVAR) for the treatment of abdominal aortic aneurysms in the non-acute setting has an established decrease in perioperative mortality compared with open repair (Greenhalgh et al, *Lancet* 2004;364:843-8; Prinssen et al, *N Engl J Med* 2004;351:1607-18). We have conducted a systematic review and meta-analysis to examine the outcomes of EVAR in the subgroup of patients with ruptured abdominal aortic aneurysm to determine the published in-hospital mortality and examine adverse events. **Methods:** We searched electronic databases, relevant reference lists, clinical trial registries, conference proceedings and contacted authors to identify published and unpublished observational studies of patients undergoing EVAR for rAAA (REVAR). Where necessary, authors were contacted to provide supplementary data. The pooled in-hospital mortality was calculated using the generic inverse variance function of the REVMAN software, and an exploration of heterogeneity was undertaken through sensitivity analysis to identify possible confounders identified a priori. Adverse events and details of algorithms

created to assess eligibility for REVAR at each centre were also collected. **Results:** Sixteen observational studies describing 3061 rAAAs and 400 REVAR patients fulfilled the criteria to be included in this review. Overall, study quality was low. The pooled in-hospital mortality reported by the authors was 20% (95% CI 12–28). This should be interpreted with caution because of the high heterogeneity ($I^2 = 88\%$) in this group of observational studies. Sensitivity analyses revealed that expertise and study quality are important confounders. Adverse events, including renal morbidity, paraplegia and abdominal compartment syndrome, do occur postoperatively in patients undergoing REVAR. The rate that patients with rAAA were deemed ineligible for REVAR was 52% (95% CI 43–61) over 8 studies in which it was reported. **Conclusion:** Comparison of pooled mortality rates from observational studies of REVAR with established mortality rates of open repair of rAAA suggest benefit, however, both the exclusion of outcomes of patients who are ineligible for REVAR and the methodologic limitations of the observational studies included in this review restrict the generalizability of this conclusion. Further investigation is needed.

SURGICAL TREATMENT FOR SEVERE STEAL SYNDROME ASSOCIATED WITH DIALYSIS ACCESS. *D. Szalay, A. Jabromi, L. Mills, J. Mosakoski.* Division of Vascular Surgery, St. Joseph's Health Care and McMaster University, Hamilton, Ont.

Purpose: To review our institutional experience and success with the surgical treatment for severe steal syndrome associated with dialysis access. **Methods:** A prospective database of all patients undergoing arteriovenous fistula creation between January 2000 and December 2005 at a single regional hemodialysis centre was reviewed. Patients who required surgical intervention to treat a steal syndrome were identified. Information pertaining to demographics, type of fistula, choice of treatment and outcome was collected for this subgroup of dialysis patients. **Results:** Between January 2000 and December 2005, 867 arteriovenous fistulas were created in 462 patients. Fifteen patients developed symptoms or signs of steal syndrome determined to be severe enough to require surgical intervention. The average age was 64 years, and 10 (66%) patients were female. Surgery was indicated for one or more of the signs or symptoms of severe steal including ischemic pain, sensorimotor dysfunction or tissue loss. Six (2 brachiocephalic and 4 radiocephalic fistulas) were ligated. In the remaining 9 patients, a functional fistula was initially salvaged. Eight patients, 4 with brachiocephalic and 4 with brachiocephalic fistulae, underwent distal revascularization and interval ligation (DRIL) procedure. One patient with a radiocephalic fistula underwent ligation of the radial artery distal to the fistula to correct reversal of flow. Of the 8 DRIL procedures, 5 fistulas remained functional at a median follow-up of 28 months. In one patient the DRIL procedure failed to adequately correct the ischemia, requiring subsequent ligation of the fistula 5 months after revascularization. One patient underwent ligation following a successful transplant, and one patient died of causes unrelated to the DRIL procedure. **Conclusion:** Severe arterial steal following arteriovenous fistula creation is a relatively uncommon but significant problem in the hemodialysis

population. In our experience with subsequent surgical intervention it may be possible to both salvage the fistula and to correct the arterial steal in the majority of patients.

UNDERUTILIZATION OF STATIN THERAPY IN PATIENTS WITH ATHEROSCLEROSIS IN ONTARIO, CANADA: A POPULATION-BASED STUDY. *M. Al-Omran, S. Verma, T.F. Lindsay, M.M. Mamdani; for the Systematic Assessment of Vascular Risk (SAVR) Investigators, University of Toronto. Division of Vascular Surgery, Toronto General Hospital, the Division of Cardiac Surgery, St. Michael's Hospital, and the Institute for Clinical Evaluative Science, University of Toronto, Toronto, Ont.; Division of Vascular Surgery, King Saud University, Riyadh, Saudi Arabia.*

Background: Current evidence suggests that statin use plays an important role in improving the adverse cardiovascular outcomes in patients with atherosclerosis. This study was undertaken to identify the utilization of statin therapy in this high risk group. **Methods:** We conducted a population-based cross-sectional time-series analysis of data collected between April 1, 1995, and March 31, 2004, using the administrative databases of Ontario, Canada. **Results:** During the study period, 343 154 atherosclerotic patients entered the study of whom 235 615 (68.7%) had coronary diseases (CAD), 115 012 (33.5%) had cerebrovascular disease (CVD) and 23 886 (7.0%) had peripheral arterial disease (PAD). About 46% were female and mean age was 77.1 years (standard deviation 7.5). The percentage of statin users increased considerably in all groups of atherosclerotic patients, increasing from 9.8% to 55.3% in all atherosclerotic patients ($p < 0.01$), from 11.8% to 61.2% in CAD patients ($p < 0.01$), from 5.3% to 41.2% in CVD patients ($p < 0.01$), and from 6.8% to 43.3% in PAD patients ($p < 0.01$). During the entire study period, the percentage of users of statins was lowest among PAD and CVD patients, followed by patients with both a history of PAD and CVD. Our projections show that by 2010, the percentage of statin users is expected to reach 72% for PAD patients, 76% for CVD patients and 93% for CAD patients. **Conclusion:** The use of statin therapy in patients with atherosclerosis identifies a care gap, despite the considerable increase in its use. Given the heightened risk of cardiovascular adverse outcomes in patients with atherosclerosis, these data have important implications.

AXILLARY ARTERY TO RIGHT ATRIUM SHUNT FOR HEMODIALYSIS ACCESS IN A PATIENT WITH ADVANCED CENTRAL VEIN THROMBOSIS: A CASE REPORT. *D. Kopriva, A. Moustapha, D. McCarville. Division of Vascular Surgery, Regina General Hospital, Regina, Sask.*

We present the case of a 38-year-old patient with renal failure secondary to lupus, complicated by complete thrombosis of the superior vena cava and brachiocephalic veins, as well as the femoral and iliac veins and inferior vena cava to the level of the hepatic veins. Renal replacement therapy was inadequate on peritoneal dialysis, so a subcutaneous, right chest shunt from the axillary artery to the right atrium was created with polytetrafluoroethylene (PTFE) for use as hemodialysis access. One previous similar case is described in the literature.

ONLINE AUDIT TOOLS FOR CEA: IS IT APPROPRIATE? *P. Nault, S. Elkouri, V. Daniel, K. Okrainec, M.E. Blanchard; for the Vascular Outcome Research Team with Electronic Expertise (VORTEX). Hull, Quebec and Montréal, Que.*

Background and objectives: Several suggestions have been proposed to ensure that patients are offered carotid endarterectomy (CEA) at acceptable risk for appropriate indications. MOLIERE, or "Modification of Outcomes by Lowering Ischemic Events after Reconstruction of Extracranial vessels," is a prospective study using an online registry to determine practice patterns and results of CEA in the province of Quebec. The concept behind MOLIERE is that surgeon implication in a prospective manner is a prerequisite for them to evaluate, compare and improve their practice. **Methods:** All Quebec surgeons who performed CEA were invited to participate in this study, sponsored by the Société des sciences vasculaires du Québec (SSVQ), the Association des chirurgiens vasculaires du Québec (ACVQ) and the Canadian Society for Vascular Surgery (CSVS). Sixty variables relevant to CEA were entered prospectively by surgeons in a user-friendly online secure and confidential database between May 24, 2004, and May 31, 2005. Descriptive statistics and confidence intervals were used. **Results:** Forty-eight percent (23/48) of the surgeons and 34% (10/29) of the institutions in Quebec participated in the study. A total of 282 patients, mean age of 68 (range 46–91) years, were enrolled in MOLIERE study. Fifty-six percent (159/282) were symptomatic and 43% (123/282) were asymptomatic. All operations were done under general anesthesia. CEA were done with angioplasty in 89% (252), primary closure in 9% (24) and by eversion in 2% (6). Follow-up at 30 days was achieved for all patients. The 30-day stroke and death rates for symptomatic and asymptomatic patients were 3.1% (95% confidence interval 1.0%–7.2%) and 0%, respectively. Other 30-day results were:

30-day results after reconstructive vascular surgery		
Outcomes	Symptomatic, % (n = 159)	Asymptomatic, % (n = 123)
Stroke and death rate	3.1 (5)	0
TIA rate	1.3 (2)	0.8 (1)
Stroke rate	2.5 (4)	0
Death rate	1.3 (2)	0
Cardiac complications	3.8 (6)	8.1 (10)
Composite outcome of cardiac complications, stroke or death	6.3 (10)	8.1 (10)

TIA = transient ischemic attack.

Conclusion: MOLIERE is the first Canadian online prospective registry allowing surgeons to audit CEA results. Scientific vascular societies played a key role in supporting this project. The next step for MOLIERE is to validate its results and to examine the appropriateness and results of CEA among participating institutions. The future of MOLIERE is validation of its concept, increased participation by groups of surgeons interested in sharing their outcomes on a secure internet Web site and integration of a multidisciplinary approach.

POSTERIOR ELBOW DISLOCATION CAUSING BRACHIAL ARTERY TRANSECTION: MISDIAGNOSIS AND DELAY IN TREATMENT. *N. Alanezi, A.D. Dueck, F.M. Ameli.* Division of Vascular Surgery, St. Michael's Hospital, University of Toronto, Toronto, Ont.

Transection of the brachial artery is a rare but well recognized complication of posterior elbow dislocation. Rapid diagnosis is essential in order to avoid the potentially devastating complications of prolonged upper limb ischemia.

We describe a patient who sustained a closed, posterior elbow dislocation who presented at a community hospital. The dislocation was reduced, but there was a 12-hour delay in diagnosis. The patient was noted to have an absent radial pulse, and a stellate block had been carried out. The orthopedic surgeon eventually recognized the problem, and the patient presented at our emergency department 16 hours after the injury.

Preoperative CT angiography revealed no flow in the brachial artery. Operative exploration revealed a significant amount of hematoma, and the brachial artery had been completely trashed for approximately 5 cm in length. The artery was reconstructed using reversed saphenous vein graft. In spite of the delayed diagnosis and presentation, an excellent vascular result was obtained. He has been seen 5 months in follow-up, and he has the full use of his arm.

The important issues are that despite a posterior dislocation being a rare event, it can cause brachial artery injury, and it is imperative that early diagnosis leads to early treatment. The type of injury that this patient sustained would not have been amenable to a stent graft.

ACETYLCYSTEINE (AC) AND ISCHEMIA-REPERFUSION INJURY: PREVENTING PARALYSIS AND REDUCING SPINAL CORD OXIDATIVE STRESS FOLLOWING CROSS CLAMPING OF THE THORACIC AORTA IN PIGS. *M.P. Lisi, N. Sne, A. Ingram, J. Krepinsky, A. Powers, C.S. Cina.* Departments of General Surgery, Vascular Surgery, Clinical Epidemiology and Biostatistics, Nephrology, and Trauma, McMaster University, Hamilton, Ont.

Background: Thoracoabdominal aortic aneurysm (TAAA) repair requires clamping of the thoracic aorta. End-organ ischemia-reperfusion (IR) injury to vital organs distal to the clamping site (spinal cord) remains a severe cause of morbidity. Paraplegia, which affects 6%–40% of cases, is the most severe of these complications. Acetylcysteine (AC) has been studied to reduce the toxic effects on cell damage from free radicals and is the most promising drug due to its potent antioxidant effect, minimal expense, clinical applicability and limited side-effects. **Purpose:** The aim of this study is to evaluate the role of AC as an adjunct to protect the spinal cord from injury induced by IR caused by clamping of the thoracic aorta within the pig animal model. **Methods:** Approval was obtained by the Institutional Ethics Review Board. Experimental design: female pigs were randomized to the following groups: 1) Treatment (thoracotomy + cross clamp + AC); 2) Control (thoracotomy + cross clamp + placebo); 3) Sham with AC (thoracotomy + AC); and 4) Sham without AC (thoracotomy + placebo). AC (150 mg/kg) or placebo was given 5 minutes before a 30-minute cross-clamp period and 6 hours following the initiation of cross

clamp. Clinical assessment: animals were assessed for paraplegia at 24 hours by a blinded assessor using the modified Tarlov's scoring system which grades deficits on a scale from 4 (no deficit) to 0 (complete paralysis). Analysis of oxidative stress: animals were euthanized at 24 hours, and the spinal cords were examined for oxidative stress using the oxyblot Western blotting kit. **Results:** Experimental design: forty pigs (mean weight 30–40 kg) were randomized to Treatment ($n = 17$), Control ($n = 18$), Sham without AC ($n = 4$) and Sham with AC ($n = 1$). Operative time, estimated blood loss, intravenous fluid supplementation and oxygenation were similar between all groups. Clinical assessment: the mean Tarlov's paraplegia score at baseline for all groups and at 24 hours for Sham with and without AC was 4 ± 0 . At 24 hours, the mean Tarlov's score for the Treatment group was 3.35 ± 1.32 compared with 2 ± 1.75 for the Control group ($p < 0.02$). Analysis of oxidative stress: oxyblots showed a relief of oxidative stress with AC treatment (group 1) when compared with controls (group 2) ($p < 0.05$). **Conclusion:** Ischemia reperfusion is one of the main causes of end-organ injury after ischemic stress as the generated reactive oxygen intermediates lead to cell damage. AC reduces reactive oxygen free radicals. Our study is the first study to coordinate biochemical and histopathologic findings with a clinically significant outcome. AC plays an important role in protecting spinal cord from oxidative stress and prevents paralysis from IR injury in the pig model.

COMPLEX THORACIC AORTIC RECONSTRUCTION WITH CLAMSHELL SINGLE-STAGE APPROACH: A MERGER OF CARDIAC AND VASCULAR SURGERY. *R. Whitlock, K. Teoh, D.A. Szalay, T. VanHelder, J.G. Tittley.* Division of Vascular Surgery, McMaster University, Hamilton, Ont.

Background: Surgical repair of complex thoracic aortic pathologies remains technically challenging with associated high morbidity and mortality when performed in multiple stages. Despite the dawning of the endovascular era, with ever increasing creative solutions, open surgical reconstruction is often the only clinical option. Removing traditional anatomic boundaries between surgical specialties may expand surgical options and improve outcomes. **Methods:** Ten consecutive single-stage surgical reconstructions of complex thoracic aortic pathologies, over a 23-month period (April 2004–March 2006), involving dissections and aneurysms of the ascending, transverse arch and descending thoracic aorta, were reviewed. A collaborative multidisciplinary protocol, capitalizing on both cardiac and vascular surgical expertise in a major thoraco-abdominal aortic centre was followed. A bilateral anterolateral thoracotomy approach (clamshell incision) was used with profound hypothermic circulatory arrest (20°C) and an “arch first” reperfusion strategy. Supra-aortic trunks were individually reconstructed in sequence and reperfused. Intercostal collaterals were replanted during repair of descending thoracic aorta. Coronary bypass was performed concomitantly in 2 patients. Patients were assessed for morbidity and mortality. Perfusion data were collected as well as bleeding and transfusion patterns. Intensive care unit (ICU) and hospital length of stays (LOS) were measured. **Results:** Seven of the 10 patients had previous thoracic surgery for cardiovascular indication. Nine of 10 patients (90%) survived. There were no neurologic deficits

among the survivors. Three patients (30%) experienced postoperative confusion, all of which resolved after discontinuing neuroleptics. None of the survivors experienced deterioration in renal function, and no patient required re-exploration for bleeding. Median ICU length of stay was 3.4 days (2–6 d) and hospital LOS was 13 days (9.5–16 d). Technical description, perfusion data and transfusion profile are provided. **Conclusion:** Repair of complex thoracic aortic pathologies with a single-stage “clamshell” approach is well tolerated and may have advantages over traditional multi-stage procedures. Surgical reconstruction remains the mainstay of treatment and sets the standard from which new endovascular approaches must be gauged. The technique described may be setting the stage for a greater variety of open and “hybrid” procedures to deal with remaining pathology in the thoraco-abdominal aorta. In this series, a multidisciplinary approach has expanded our repertoire in dealing with these complex and challenging cases.

EVOLVING TRENDS IN MAJOR LIMB AMPUTATION. *J. Dooner, S. Lee, P. Kuechler.* Vancouver Island Health Authority, Victoria, BC.

Major limb amputation has a major impact on bed utilization in vascular surgery. It is most often a consequence of advanced ischemia associated with significant comorbidities. Our community has adopted a chronic disease management model for diabetes and implemented improved wound management practices throughout the health authority through education and standardization of protocols. An active foot and leg ulcer clinic acts as a point of referral for most patients with complex leg ulcers. We have examined the incidence of major amputation between April 1, 2000, and November 2005. A total of 286 cases was analyzed. The annual number of amputations has not varied dramatically but may be trending up (range 44–54). The problem affects males more than females (2:1). The average age is 68 years, and below-knee amputations are more common than above-knee (2:1). The mortality rate in this cohort has been high but is trending down. The highest mortality was 20.5% in 2002–2003 and was associated with the shortest average length of stay. The highest incidence of diabetes (75%) was noted in this group along with the fact that 13% were on dialysis. The most recent period in 2005 indicates a significant reduction in mortality (6.5%) with a rise in the percentage of patients on dialysis (19.4%), but 54% of the group was diabetic.

Taken in isolation these data are hard to interpret, however, the trend over time suggests we are seeing just as many patients for amputations, but that the mortality rate associated with the event is falling. The increasing prevalence of dialysis in this population may be significant. It may account for some of the reduction in mortality through better management of comorbidities. Long-term survival was not addressed in this study, but the increasing need for amputation in dialysis patients makes one consider the role of screening for peripheral vascular disease (PVD) in pre-dialysis patients. Average length of stay is trending down from 74 days in 2000 to 41.87 days in 2005.

The need for major limb amputation does not show any sign of decreasing. The spectrum of comorbidities does seem to be changing with an increase in dialysis as a co-factor. A reduction in length of stay and mortality has occurred in con-

junction with other infrastructure changes suggesting that there is improvement in the overall management of amputees. The high impact of this group on bed utilization is worth studying in order to provide better patient flow and outcomes.

AXILLOFEMORAL VENOUS BYPASS GRAFTING FOR MANAGEMENT OF UPPER EXTREMITY AUTOGENOUS HEMODIALYSIS ACCESS COMPLICATED BY CENTRAL VENOUS OCCLUSION. *P.S. MacDonald, R. Werb, R.S. Sidhu, J.D.S. Reid, J. Clement.* Divisions of Vascular Surgery and Nephrology and Department of Radiology, St. Paul's Hospital, Vancouver, BC.

Objective: Infrequently, hemodialysis patients will present with otherwise well matured upper extremity autogenous arteriovenous fistulas (AVF) that suffer central venous occlusion not amenable to percutaneous dilation. Reported is our centre's innovation and 5-year experience with decompressive axillofemoral venous bypass for concomitant symptomatic relief of venous hypertension and dialysis access salvage. **Patients and methods:** Four patients with upper extremity autogenous arteriovenous fistulas complicated by ipsilateral innominate vein or superior vena cava obstruction were treated with externally supported expanded polytetrafluoroethylene axillofemoral (ePTFE) grafts taken end-side from the ipsilateral axillary vein, tunneled subcutaneously and anastomosed end-side to the ipsilateral common femoral vein. All AVFs were proven on angiogram to be free of inflow or graft stenosis and were noted to have central venous occlusion thought to be causing symptomatic arm swelling and impaired dialysis flows. All central venous occlusions were associated with multiple prior failed attempts at percutaneous management of central venous stenosis/occlusion. Postoperatively, graft patency and flow velocities were established by duplex ultrasonography. Venous pressures and access flows were measured before and after bypass in 3 patients. Relief of symptoms was assessed on subsequent dialysis sessions after surgery. Need for AVF/ePTFE graft revision in any segment from ipsilateral subclavian artery inflow to inferior vena cava outflow was recorded. **Results:** Three brachiocephalic and 1 transposed brachiocephalic fistula were salvaged. There were no perioperative complications. All patients (average age 61.5 yr) remain alive with patent AVF/ePTFE grafts (average 25.5 mo, range 4–53 mo). Average ePTFE graft velocities recorded at the inflow, upper anastomosis, upper graft, lower graft, lower anastomosis and outflow were 95.2 cm/s, 231.3 cm/s, 166.2 cm/s, 107 cm/s, 194.3 cm/s and 94.6 cm/s, respectively. After axillofemoral venous bypass grafting, average AVF pressures dropped 13.6% (125–108.3 mm Hg), and flow rates increased 6.8% (1883–2020 mL/min). All patients reported marked relief of arm swelling within 48–72 hours after surgery and remain asymptomatic today. One patient required subsequent successful angioplasty of a mid-AVF stenosis. No ePTFE grafts have required revision. **Conclusions:** Axillofemoral venous bypass grafting has provided durable dialysis access and symptom relief in our study population. Brisk graft velocities and decreased AVF pressures might contribute favourably to the noted ePTFE graft patency and decrease in arm swelling.

ENDOVASCULAR STENT GRAFTING IS MORE COST-EFFECTIVE

THAN OPEN SURGICAL REPAIR FOR BLUNT THORACIC AORTIC INJURY. *P.K. Koka, P.J. Karanicolas, D.M. Payne, S.K. Koka, I. Naqvi, M.W. Chu, K. Croome, T.L. Forbes.* University of Western Ontario, London, Ont.

Background: Endovascular stent graft (EVSG) technology has considerable implications for the management of thoracic aortic injuries secondary to blunt trauma. Recent evidence suggests that improved clinical outcomes, as demonstrated by reduction in mortality and paraplegia rates, are obtained when thoracic aortic injuries are treated via EVSG versus open surgical repair (OSR). Due to the initial cost of the technology, this therapeutic intervention has not been adopted universally. **Objective:** To conduct a cost-effectiveness analysis of EVSG versus OSR for the treatment of blunt thoracic aortic injuries. **Methods:** All patients who underwent surgical treatment for blunt thoracic aortic injury, via EVSG or OSR, at our centre were identified, and pertinent baseline demographic, operative details and clinical outcomes were collected and compared. Overall in-hospital, rehabilitation and follow-up costs over a 1-year period were collected for all patients and adjusted appropriately to obtain costs at current value (2006 CAN\$). A base case cost-effectiveness analysis was conducted comparing the average cost of each procedure to overall clinical outcomes of each. To obtain more generalizable results, a Markov decision-analytic model was developed to estimate costs and effects for each intervention. A thorough systematic review of the literature was conducted to obtain accurate probability estimates for different outcomes. The average costs of the initial hospitalization, complications, subsequent interventions, rehabilitation and follow-up costs were obtained from our hospital's case costing centre, the Ontario Case Costing Initiative, the Ministry of Health and the literature. The impact of uncertainty on the base case results was assessed using a probabilistic sensitivity analysis and techniques of Monte Carlo simulation. Our measure of outcome was cost-effectiveness ratio with mortality and paraplegia as primary clinical outcomes of interest. **Results:** From 1991 to 2006, 28 patients underwent repair of a blunt thoracic aortic injury (EVSG 15; OSR 13). The patients were well matched as no significant differences were found in demographics, degree of injury, crash statistics and concomitant injuries and surgical procedures. The open group had an overall mortality of 23% ($n = 3$) and a paraplegia rate of 15% ($n = 2$). In comparison, the overall mortality in the EVSG was 13% ($n = 2$), and there was no occurrence of paraplegia. The average cost for treating one patient by EVSG for a blunt thoracic aortic injury was \$59 553.82, compared with an average cost of \$67 752.52 for open surgical repair. Therefore, a reduction in mortality by 1 and paraplegia by 2 can be obtained with a reduction in cost of \$8198.70 per patient. For the decision analysis model, pooled estimates for outcomes were obtained from the literature. The overall in-hospital mortality was 26% for OSR and 9.8% for EVSG, and the risk of paraplegia was 9.5% for OSR and 2.2% for EVSG. The average cost for treatment by EVSG was \$47 772.13 and \$51 118.15 for OSR. Therefore, it is shown that OSR costs

\$3346.02 more than EVSG with most of the additional cost burden attributable to costs associated with rehabilitation and follow-up care for paraplegic patients. **Conclusion:** This analysis demonstrates that EVSG is an appropriate intervention to treat thoracic aortic injuries and results in improved clinical outcomes with a reduction in overall costs. The misconception that it costs more is false, as demonstrated by our base case analysis and decision analysis model.

LASER CAPTURE MICRODISSECTION FOR ANALYSIS OF CELL TYPE SPECIFIC GENE EXPRESSION IN HUMAN ABDOMINAL AORTIC ANEURYSMS. *Q. Dan, A. Lossing, D. Courtman.* Terrence Donnelly Cardiovascular Laboratories, St. Michael's Hospital, and the Department of Surgery, University of Toronto, Toronto, Ont.

Late stage human abdominal aortic aneurysms are composed of a heterogeneous cell population consisting of extensive inflammatory infiltrates, neocapillaries, macrophages and endogenous smooth muscle. Although numerous studies have examined gene expression in transmural aneurysm samples cell type specific expression has not been explored. We collected samples from 9 patients undergoing elective surgery for aneurysms ranging from 5.2–12.0 cm in diameter (mean 6.95 ± 2 cm): samples were snap frozen, cryosectioned and stained for smooth muscle-specific α actin with a rapid direct immunofluorescence technique. Ultraviolet (UV) laser microdissection was performed on 8–20 sections from each sample capturing 30–200 positively stained regions per section. RNA was isolated and either reverse transcribed for real-time polymerase chain reaction (PCR) analysis or T7 based amplified with the RiboAmp kit (Arcturus Eng.) for mini-array analysis. PCR analysis of SM- α actin expression was used to confirm enrichment of cell type specific RNA in 7 samples, with a mean 26.8-fold (± 7.6 -fold) increase in captured RNA versus that in the whole section (1.0 ± 0.08). A cDNA micro-array (GEArray, SuperArray) analysis revealed a distinct profile of enhanced expression in captured smooth muscle cells versus the whole tissue. In particular, MMP-1, PAI-1 and integrin Beta 1 all showed increased mRNA levels in captured smooth muscle; these results were quantitatively confirmed by real-time PCR analysis with mean 29.28-fold (± 12 -fold), 18.8-fold (± 6 -fold), 9.1-fold (± 3 -fold) enrichment, respectively. In contrast, MMP-13 mRNA was markedly elevated in the whole tissue versus smooth muscle (201-fold ± 68 -fold enrichment). When compared with regions of non-involved aorta, smooth muscle cells from aneurysmal segments markedly overexpressed the acidic glycoprotein osteopontin; this mRNA overexpression was confirmed by immunohistochemistry. In conclusion, we have developed and validated a laser capture microdissection technique that can be readily used to isolate cell type specific gene expression in human aneurysm tissue. In general, smooth muscle cells in late stage aneurysms exhibit a distinct pattern of gene expression which may be more reminiscent of matrix remodelling and repair than pathogenic expansion.