

VASCULAR SURGERY

**VS001**  
**ABDOMINAL AORTIC ANEURYSM DISEASE IS NOT JUST**  
**ATHEROSCLEROSIS – GENETIC AND PHENOTYPIC**  
**COMPARISONS**

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**Purpose** It is often assumed that aortic aneurysm (AAA) and peripheral vascular disease (PVD), as well as coronary artery disease (CAD) are simply different manifestations of atherosclerosis with similar risk factors and strategies for prevention. Phenotypic and genetic risk factors are compared in unrelated Caucasian individuals.

**Methods** A detailed demographic risk factor questionnaire was completed in patients with AAA, ( $n = 434$ ), PVD, ( $n = 250$ ) or CAD, ( $n = 207$ ) with a group of healthy elderly controls ( $n = 358$ ). A blood sample was drawn for genomic DNA extraction, plasma lipids, Lp(a) and hsCRP. Carotid intimal medial thickness and aortic diameter were measured by ultrasound. The frequencies of twenty common relevant functional genetic polymorphisms were determined. Risk factors were modelled using multiple logistic regression to determine adjusted odds ratio (OR).

**Results** While risk factors common to each vascular disease group were observed there were significant differences. Diabetes was associated with both PVD (OR 3.0) and CAD (OR 2.1), but not with AAA. Familial AAA patients diabetes showed a reduced risk association (OR 0.13, CI 0.02–0.94). Hypercholesterolemia had a reduced risk in AAA but hypertension and smoking had a higher association with AAA and PVD than CAD ( $P < 0.001$ ). High sensitivity CRP was far greater for AAA (17.2–21.0 mg/L,  $P < 0.005$ ). Several genetic polymorphisms including MMP9 C-1562T (OR 2.4, (1.38–4.27) and the PAII 4G5G polymorphisms, appeared to be differentially associated with AAA.

**Conclusion** AAA has its own distinctive risk factors. There are important implications for their use in screening, prevention and treatment compared to other vascular diseases.

**VS002**  
**EFFECT OF PRE-OPERATIVE VARIABLES ON THE MID-TERM**  
**OUTCOMES FOR PATIENTS TREATED IN AUSTRALIA FOR**  
**ENDOVASCULAR ANEURYSM REPAIR**

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**Purpose** To review the data from the ASERNIP-S audit of endovascular aneurysm repair (EVAR) in order to evaluate the effect of pre-operative variables on the mid-term outcomes of the procedure.

**Methodology** Initial audit data was collected from surgeons for Australian patients treated for EVAR between 1 November 1999 and 16 May 2001. Ongoing follow-up data for this group will continue until August 2006. Statistical analysis was performed to review the effect of pre-operative variables on mid-term outcomes.

**Results** The most significant predictor of overall successful outcome following EVAR is smaller pre-operative aneurysm size. Graft migration is associated with larger aneurysms and a higher number of pre-existing comorbidities. Graft complications are statistically significantly linked with aneurysm size, graft type, ASA and a higher number of pre-existing conditions. The risk of developing type I endoleaks is strongly associated with aortic neck angle and infrarenal neck length as well as certain types of devices. As expected, late death is associated with ASA, pre-existing conditions and age, but it is also correlated with larger aneurysms. Aneurysmal factors associated with early death are aneurysm size and aortic neck angle.

**Conclusions** The Australian audit of EVAR has provided an excellent opportunity to assess the mid-term outcomes against pre-operative factors. As the audit reaches its conclusion in 2006, long term results (>5yrs) will become available and in combination with the mid-term results could help provide a predictive model for clinicians.

**VS003**  
**COMBINED CORONARY AND CAROTID ARTERY DISEASE:**  
**UPDATE ON MANAGEMENT STRATEGIES**

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The optimal management strategy for significant concurrent disease in the coronary and carotid systems has yet to be elucidated, despite a wide body of literature on the subject. The classical primary therapeutic options available for coronary and carotid atherosclerosis, namely surgical coronary revascularization utilizing cardiopulmonary bypass, and carotid endarterectomy, respectively, have now been supplemented by a broader spectrum of evolving techniques. 'Off-pump' coronary artery bypass grafting, more advanced methods of percutaneous coronary intervention, and the endovascular management of carotid stenosis, are all now widely available, and serve to expand the treatment options available for the patient with comorbid coronary and cerebrovascular disease. We sought to review the literature, particularly in light of these newer revascularization strategies, in an attempt to define an up-to-date, logical approach to the patient with marked dual-system disease.

**VS004**  
**USE OF A PTFE FELT COLLAR DURING OPEN REPAIR OF**  
**JUXTA-RENAL AAA**

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**Objective** To report use of a circumferential polytetrafluoroethylene (PTFE)-felt collar (PFC) incorporated into the proximal anastomosis (PA) to aid repair of juxta renal AAA (JRA) which required suprarenal clamping (SRCA).

**Methods** Between January 1986 and December 2005 the second author repaired 1203 AAA (108 endoluminal, 1 fenestrated). From January 1993 that author introduced a PFC placed circumferentially around the infrarenal aorta incorporated into the PA suture. This report details results for those AAA without a suitable neck for safe infrarenal clamping.

**Results** Of 737 AAA repaired between January 1993 and December 9 2005, 173 were SRCA (132 non-ruptured [NR] and 41 ruptured). Achievability of PFC was 100% for the last 77 consecutive NR-SRCA. Mortality for NR-SRCA was 4.5% (6/132) compared to 2.1% (8/388) for NR infrarenal clamped AAA repaired during the same period. Mortality for NR-SRCA using PFC was 1.8% (2/114) compared to 22% (4/18) for NR-SRCA without PFC. Clamp times were equivalent for NR-SRCA with and without PFC. Of the 132 NR-SRCA a sustained rise in creatinine occurred in 22 (17%) comprising 12 of 29 (41%) if pre-operative creatinine was abnormal and 10 of 103 (9.7%) if pre-operative creatinine was normal.

**Conclusions** PFC incorporation into the PA of JRA is highly achievable and does not prolong clamp time. This creation of an artificial, operable infra-renal neck simplifies suture placement and confers a robust, haemostatic reconstruction commencing immediately below the level of the renal arteries where the aorta had been originally ectatic or aneurysmal and often heavily diseased and calcified.

**VS005**  
**VALIDATION OF A NOVEL CAROTID ENDARTERECTOMY RISK**  
**PREDICTION SCORE**

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**Purpose** To audit the local carotid endarterectomy results and to examine the validity of a previously derived carotid endarterectomy risk prediction (CERP) score.

**Methodology** Prospectively collected vascular unit database of patients who underwent carotid endarterectomy (CEA) between January 2001 to April 2005 at John Hunter Hospital was retrospectively analyzed. Observed 30 day risk of ipsilateral stroke and/or death was plotted against the CERP score. The significance of trend was analyzed by chi squared test and the

goodness of fit of prediction was assessed by receiver operating characteristic (ROC) curve.

**Results** One hundred and ninety eight CEA patients were identified from the vascular unit database. Of these, 184 patients had complete data for analysis. The median age was 69 years old and 66.8% of the patients were male. Sixty seven percent of the patients had symptomatic carotid disease. The 30 day perioperative rate of established ipsilateral stroke or death was 8.7%. The observed versus predicted risk graph demonstrated significant trend ( $P = 0.01$ ) and the ROC area of 0.73 suggested that the CERP score was a well functioning prediction model ( $P < 0.0001$ ).

**Conclusions** The outcome of carotid surgery at John Hunter Hospital was acceptable compared to the perioperative risk reported in large international trials. The CERP score has been validated by a different dataset and it may prove to be useful in patient selection and consent.

#### VS006

### A PILOT STUDY ASSESSING THE EFFICACY OF VACUUM ASSISTED CLOSURE (VAC) AS AN ADJUNCT TO COMPRESSION BANDAGING FOR THE TREATMENT OF CHRONIC RESISTANT VENOUS ULCERS

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**Purpose** Venous ulcers can be healed by application of compression bandages, but 20–30% are refractory and require adjunctive treatments to stimulate healing. Vacuum assisted closure (VAC) is an established wound management system used to improve healing rates, in part by removal of exudate and inflammatory mediators. We aimed to pilot the use of VAC as a simultaneous adjunct to compression bandaging for refractory venous ulcers and assess its feasibility, safety and impact on ulcer healing.

**Methodology** Patients attending a specialist wound care clinic with venous ulcers that had failed to heal despite >12 weeks of full compression bandaging using multi-layer elastic bandages and ulcer surface area at least 2 sqcm and <10% reduction in ulcer area during a 2 week observation period were enrolled to receive adjunctive VAC (changed 3x per week) for 4 weeks. Outcome measures were tolerability, change in ulcer area and depth and quality of the ulcer base.

**Results** 7 patients (aged 75 (56–82) years, 4 female) with 12 refractory ulcers (duration 23 (9–62) months) were enrolled. Combined VAC/compression was well tolerated. There was no morbidity related to the treatment regimen. VAC appeared to stimulate rapid development of granulation tissue in the ulcer bed and reduction in ulcer depth but not ulcer area but return to compression alone was associated with ulcer area reduction.

**Conclusions** This pilot study suggests that combined intermittent VAC and compression bandaging may have a role in management of refractory venous ulcers. A randomised study is required to confirm these preliminary observations.

#### VS007

### THE INFECTED AORTIC GRAFT

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**Purpose** The use of prosthetic grafts in the management of aortic aneurysms or occlusive disease results in a 1–2% graft infection rate. We report on the outcome of all such cases treated in our institutions since 1968.

**Methodology** Cases were identified from a retrospective search of our vascular registry. They were divided into graft limb infection (Group 1), graft body infection (Group 2) and aorto-enteric fistula (Group 3).

**Results** Sixty cases were identified with a median age of 62 years and a median time since graft implantation of 42 months. There were 23 cases in Group 1, 16 in Group 2 and 21 in Group 3. The commonest infecting organisms were staphylococcus aureus and staphylococcus epidermidis. The median survival was 15 months.

Five cases were treated conservatively with long-term antibiotics. Fifty-five cases have undergone a further 239 vascular procedures. Group 1 usually underwent excision of the infected limb alone whereas Group 2 and Group 3 usually underwent explantation of the entire graft. Various techniques for revascularization of the limbs and repair of the GI tract were used where necessary. The rates of major amputation and death were 17% and 4% for Group 1, 12.5% and 50% for Group 2 and 0% and 52% for Group 3 respectively.

**Conclusions** Graft limb infection can be treated by partial graft excision with a low mortality. In contrast, treatment of graft body infection or aorto-enteric fistula by total graft explantation has a high mortality. Long-term antibiotics are an alternative in cases unsuitable for surgery.

#### VS008

### A NEW ANIMAL MODEL OF VARICOSE VEINS

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**Purpose** The absence of a suitable model of varicose veins has long hampered the experimental investigation of varicose veins. We describe the development of a porcine hind limb model which may provide for this need.

**Method and results** Side to side arteriovenous fistula were created in one of the hind limbs of 6 young adult pigs under general anaesthesia. Rather than producing acute distension of overlying veins there developed over at least two weeks a gradual dilatation of the ipsilateral superficial veins and abdominal wall veins. After 3 months similar changes were observed in the superficial veins of the contralateral limb. In the erect, unanaesthetised animal Valsalva manoeuvre induced dramatic distension and reflux. Following resin casting and maceration of the surrounding tissue with concentrated sodium hydroxide, light microscopy allowed the anatomic features of the venous valves to be evaluated. Dilatation of the vessels and incompetence of the valves with stretching occurred. The ratio of the valve sinus height to vein diameter was increased on the ipsilateral side (0.71–0.20), and more so on the contralateral side (0.90–0.14) compared to the normal (0.54–0.08).

**Conclusion** this model has features more comparable to those in human varicose veins than other models previously described and warrants further physiological and immuno-histochemical evaluation.

#### VS009

### IN-HOSPITAL OPERATIVE MORTALITY OF RUPTURED ABDOMINAL AORTIC ANEURYSM: ANALYSIS OF 680 PATIENTS IN NEW ZEALAND OVER A 12-YEAR PERIOD

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**Purpose** To determine the mortality of ruptured abdominal aortic aneurysms (RAAA) in New Zealand.

**Design** A retrospective study of nation-wide, in-hospital mortality of RAAA. **Methods** Data was obtained from the National Society of Vascular Surgeons Audit database. A validation study was initially performed, by selecting 160 patients at random and having their outcomes resubmitted. In-hospital mortality of RAAA, as defined as death during hospital admission irrespective of cause of death, was determined in the period 1993–2005. Variables of potential influence on in-hospital mortality, including age, gender, year of rupture, type of repair and co morbidities were analysed.

**Results** The overall in-hospital mortality of RAAA in 680 patients in the 12 year period was 47.5% (33–60.9%), males and females 44.6% and 57.6% respectively.

**Conclusion** Over the preceding 12 years in-hospital mortality of RAAA has been 47.5% consistent with published data. Age, female gender, ASA score and number of other co-morbidities appear to be important risk factors.

#### VS010

### ACS POST RAAA, SURGEONS AND INTENSIVISTS, CONTRASTING VIEWS?

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**Objective** To compare the current views on the importance, prevalence and management of Abdominal compartment syndrome (ACS) post ruptured Abdominal Aortic Aneurysm (rAAA) amongst vascular surgeons and intensivists.

**Methods** A questionnaire was mailed to 116 registered vascular surgeons and 314 intensivists. Data was collected on the prevalence and importance of ACS post rAAA, and whether prophylactic measures were or should be taken to prevent ACS. Hypothetical clinical scenarios representing a spectrum of

ACS post rAAA were also presented. The responses were compared using Chi square tests.

**Results** 67% of surgeons and 39% intensivists responded. Both groups estimated the prevalence of ACS post rAAA as between 10–30% ( $P = 0.081$ ) and considered it an important entity.

Routine Intra-abdominal monitoring was advocated by 20% more of the intensivists surveyed compared to the surgeons ( $P = 0.008$ ).

In patients with borderline IAP (18 mmHg) both groups felt that surgical intervention was unnecessary. However, 14% more of the intensivists surveyed compared to the surgeons ( $P = 0.002$ ) advocated surgical intervention in the case of the clinically deteriorating patient with an elevated IAP (30 mmHg).

12% more of the surgeons advocated specific measures being taken to prevent post-operative ACS, compared to the intensivists. However, the above result was not statistically significant ( $P = 0.104$ ).

**Conclusion** Surgeons and intensivists have similar views on the prevalence and the clinical importance of ACS post rAAA. However, more intensivists advocate routine IAP monitoring than surgeons and more intensivists advocate surgical intervention in the clinically deteriorating patient with elevated IAP.

#### VS011P SUBCUTANEOUS LATERO-POSTERIOR PROSTHETIC FEMORO- POPLITEAL BYPASS. A 10 YEAR EXPERIENCE WITH A NEW TECHNIQUE

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This is our 10 year experience with a new approach to prosthetic femoro-popliteal bypass, with the purpose of facilitating thrombolysis.

A 7 mm PTFE conduit, arising from the common femoral artery, is tunneled laterally and subcutaneously in the thigh and anastomosed to the popliteal artery behind the knee using a modified 'Taylor patch' technique. The patient is positioned with a semi-lateral 45 degree tilt. Access is obtained anteriorly to the femoral artery and posteriorly to the popliteal artery by rotating the table.

Starting in May 1996, we performed 30 bypass grafts in 28 patients. Primary patency at 1 year was 75%, and secondary patency over 90% with thrombolysis. 19 patients operated prior to January 2001 completed 5 years of actual follow up. Nine of these patients died during this period, 3 with grafts patent for over 4 years and 4 with grafts patent for over a year. The remaining 10 patients had a 5 year primary patency of 50% and a secondary patency of over 60% following thrombolysis. Thrombolysis when attempted was initially successful in all patients.

This new technique compares favorably with the standard technique. The subcutaneous location facilitates thrombolysis using the bidirectional catheter technique. The lateral location also gives the option of preserving the saphenous vein for later use.

#### VS012P RUPTURED SPLENIC ARTERY ANEURYSMS . . . ARE WE PREPARED?

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The purpose of this study was to highlight the diagnostic dilemma faced by clinicians when faced with the possibility of ruptured splenic artery aneurysms.

Splenic artery aneurysms are rare, with incidence reported to be 0.7–1% with females more affected than males. The rarity of this pathology accounts for the lack of familiarity with the diagnosis and there is often delay in diagnosis and treatment when patients initially present with characteristic symptoms and recognised risk factors.

We make reference to our clinical experience with patients who have presented with this condition to illustrate the importance of early diagnosis and treatment.

Splenic artery aneurysms can present as a two-stage rupture (25% of cases).

This provides a window of opportunity to treat patients more effectively and with better outcomes.

#### Reference

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#### VS013P TREATMENT OF POPLITEAL ANEURYSMS WITH THE VIABAHN STENT GRAFT

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**Aim** Popliteal artery aneurysms are treated to prevent limb-threatening embolisation. The traditional surgical approach is a femoral to below knee popliteal bypass graft.

The endovascular covered stent graft is a technique that may be used under local anaesthesia in a relatively short time and with minimal blood loss.

In a retrospective study, we compared the 2nd generation Viabahn Endo-prosthesis with the traditional approach.

**Method** In a 3 year period (2002–2005), we had 14 patients with 15 treated popliteal artery aneurysms. Mean age of 67 years (range 57–82), 100% male.

7 were treated with self expanding covered stent grafts, 7 with a femoral-popliteal bypass, 1 with a posterior inlay graft.

All endoluminal procedures were completed with a check angiography to rule out an endoleak and demonstrate preservation of distal runoff in the calf.

Follow up evaluation was performed by a spot check duplex ultrasound. Outcome measures were patency of the graft and limb loss.

**Results** Resolution of symptoms and restoration of peripheral circulation was achieved in 100% cases, in both the endoluminal stent graft cases and the surgical group.

Immediate complications in the endovascular group was 1 groin haematoma. In the surgical group, there was 1 superficial wound infection.

Mean follow up for endovascular procedures was 16 months (range 4–32 months), and that for the traditional approach, 24 months (range 13–41 months).

There was no limb loss in either group.

**Conclusion** Our medium to short term results show that the less invasive endovascular stent graft is as good as that of conventional surgery.

This treatment option should therefore be considered in the management of popliteal artery aneurysms.

#### VS014P ACUTE BILATERAL ANTERIOR TIBIAL COMPARTMENT SYNDROME IN A HYPOTHYROID PATIENT

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**Introduction** Anterior Tibial Compartment Syndrome (ATCS) is uncommon and can lead to permanent loss of function. It is most often the result of vascular insult or limb trauma, however we report a case associated with florid hypothyroidism.

**Case Report** We present a rare case of bilateral ATCS with a staggered presentation. The patient presented with 2 days of erythema and constant pain over the right anterolateral lower leg. Clinically and biochemically she had features of marked hypothyroidism. An urgent fasciotomy was performed which revealed non-viable tibialis anterior muscle. Within 24 hours she developed the same features in the left leg requiring another fasciotomy. Ultimately extensive myonecrosis involved the anterior compartments bilaterally.

**Discussion** Acute compartment syndrome (ACS) must be acted upon promptly to avoid irreversible injury. The aetiology may not be immediately identifiable. The association of bilateral ATCS and hypothyroidism is extremely rare. A high index of suspicion and low threshold for fasciotomy are required. Despite an early diagnosis on the left side most of the anterior compartment muscle was eventually lost. The issues of prophylactic fasciotomy on the asymptomatic side and role of compartment pressure measurement are discussed. The pathophysiologic link with hypothyroidism is multifactorial including skeletal muscle hypertrophy, increased deposition of glycosaminoglycans, and increased extravasation of protein-rich fluid in the interstitial space. This rare association of ACS demonstrates that the clinician must not dismiss the possibility of an ACS in the absence of common causes such as trauma or vascular insult.