

# Selected Abstracts from the February Issue of the European Journal of Vascular and Endovascular Surgery

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## Systematic Preoperative Coronary Angiography and Stenting Improves Postoperative Results of Carotid Endarterectomy in Patients with Asymptomatic Coronary Artery Disease: A Randomised Controlled Trial

Illuminati G., Ricco J.-B., Greco C., Mangieri E., Calio' F., Ceccanei G., Pacilè M.A., Schiariti M., Tanzilli G., Barillà F., Paravati V., Mazzesi G., Miraldi F., Tritapepe L. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objective:** To evaluate the usefulness of systematic coronary angiography followed, if needed, by coronary artery angioplasty (percutaneous coronary intervention (PCI)) on the incidence of cardiac ischaemic events after carotid endarterectomy (CEA) in patients without evidence of coronary artery disease (CAD).

**Materials and methods:** From January 2005 to December 2008, 426 patients, candidates for CEA, with no history of CAD and with normal cardiac ultrasound and electrocardiography (ECG), were randomised into two groups. In group A ( $n = 216$ ) all the patients had coronary angiography performed before CEA. In group B, all the patients had CEA without previous coronary angiography. In group A, 66 patients presenting significant coronary artery lesions at angiography received PCI before CEA. They subsequently underwent surgery under aspirin ( $100 \text{ mg day}^{-1}$ ) and clopidogrel ( $75 \text{ mg day}^{-1}$ ). CEA was performed within a median delay of 4 days after PCI (range: 1–8 days).

Risk factors, indications for CEA and surgical techniques were comparable in both groups ( $p > 0.05$ ). The primary combined endpoint of the study was the incidence of postoperative myocardial ischaemic events combined with the incidence of complications of coronary angiography. Secondary endpoints were death and stroke rates after CEA and incidence of cervical haematoma.

**Results:** Postoperative mortality was 0% in group A and 0.9% in group B ( $p = 0.24$ ). One postoperative stroke (0.5%) occurred in group A, and two (0.9%) in group B ( $p = 0.62$ ). No postoperative myocardial event was observed in group A, whereas nine ischaemic events were observed in group B, including one fatal myocardial infarction ( $p = 0.01$ ). Binary logistic regression analysis demonstrated that preoperative coronary angiography was the only independent variable that predicted the occurrence of postoperative coronary ischaemia after CEA. The odds ratio for coronary angiography (group A) indicated that when holding all other variables constant, a patient having preoperative coronary angiography before carotid surgery was 4 times less likely to have a cardiac ischaemic event after carotid surgery. No complications related to coronary angiography were observed and no cervical haematomas occurred in patients undergoing surgery under aspirin and clopidogrel in this study.

**Conclusions:** Systematic preoperative coronary angiography, possibly followed by PCI, significantly reduces the incidence of postoperative myocardial events after CEA in patients without clinical evidence of CAD.

## Clinical Results of Carotid Denervation by Adventitial Stripping in Carotid Sinus Syndrome

Toorop R.J., Scheltinga M.R., Huijge M.C., Moll F.L. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Aims:** Older patients with spells of syncope may suffer from a carotid sinus syndrome (CSS). Patients with invalidating CSS routinely receive pacemaker treatment. This study evaluated the safety and early outcome of a surgical technique termed carotid denervation by adventitial stripping for CSS treatment.

**Methods:** Carotid sinus massage (CSM) during cardiovascular monitoring confirmed CSS in patients with a history of repeated syncope and dizziness. The internal carotid artery was surgically denervated by adventitial stripping over a minimum distance of 3 cm via a standard open approach. Patient characteristics, perioperative complications and 30-day success rate were analyzed.

**Results:** A total of 39 carotid denervation procedures was performed in 27 individuals (23 males, mean age  $70 \pm 3$  years) between 1980 and 2007 in a single institution. Eleven patients had a bilateral hypersensitive carotid sinus. Procedure related complications included wound hematoma ( $n = 4$ ), neuropraxia of the marginal mandibular branch of the facial nerve ( $n = 2$ ) and dysrhythmia responding to conservative treatment ( $n = 3$ ). Significant alterations in systolic and diastolic blood pressure and heart rate were not observed. One patient developed a cerebral ischaemic vascular accident on the 24th postoperative day. One patient with residual disease had a successful re-denervation within 1 month after the initial operation. Two patients with persistent symptoms received a pacemaker but also to no avail. At 30-day follow up 25 of 27 patients (93%) were free of syncope, and 24 free of a pacemaker (89%).

**Conclusion:** Carotid denervation by adventitial stripping of the proximal carotid internal artery is effective and safe and may offer a valid alternative for pacemaker treatment in patients with carotid sinus syndrome.

## An Analysis of 50 Surgically Managed Penetrating Subclavian Artery Injuries

Sobnath S., Nicol A.J., Nathire H., Edu S., Kahn D., Navsaria P.H. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objectives:** The surgical management and outcome of penetrating subclavian artery (SCA) injuries is presented in this article.

**Design:** A retrospective chart review is used to detail the management and outcome of penetrating SCA injuries.

**Patients and methods:** Patients with penetrating SCA injuries presenting to the Groote Schuur Hospital from January 1997 to December 2007 were reviewed. Demographic data, mechanism of injury, associated injuries, angiographic findings, surgical treatment, hospital stay, complications and mortality were noted.

**Results:** Fifty patients with penetrating SCA injuries were identified from an operating trauma database. Stab and gunshot wounds accounted for 40 and 10 SCA injuries, respectively. The mean Revised Trauma Score (RTS) was 7.2. Angiography was obtained in 37 patients; false aneurysm (13) and total occlusion (nine) were the two most common findings. A median sternotomy was required in 25 (50%) patients and emergency room thoracotomy was performed in two patients (4%) for initial haemorrhage control. Primary repair of SCA injuries was possible in 52% of the patients. Three SCA injuries (6%) were ligated and one patient received an endovascular stent. Morbidity was restricted to associated brachial plexus injuries. The limb salvage rate was 100% and there were no deaths.

**Conclusion:** Preoperative angiography was useful in planning an operative approach. Primary repair was possible in the majority of the patients and ligation of SCA injuries was life-saving in critically ill patients.

## Repair of Arterial Injury after Blunt Trauma in the Upper Extremity—Immediate and Long-term Outcome

Glockner J., Falkensammer J., Pellegrini L., Biehl M., Tauscher T., Fraedrich G. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objective:** In contrast to upper extremity stab and gunshot wounds, data on management and outcome in blunt trauma (BT) are limited by small numbers and short follow-up periods.

**Methods:** This study is a retrospective data analysis. All patients who had undergone arterial repair after upper-limb BT were included. Exclusion criteria were artery ligation and/or primary limb amputation. Endpoints included the following: peri-operative death, limb salvage, primary and secondary patency, vascular re-operation and/or intervention.

**Results:** Eighty-nine patients (71 male; median age: 34.6 years, range: 2.5–81.7) underwent reconstruction of 96 arteries after BT since 1989: subclavian ( $n = 16$ ), axillary ( $n = 22$ ), brachial ( $n = 48$ ) and forearm ( $n = 10$ ). Concomitant arm vein lesions were present in 15 patients (17%) and accompanying nerve ( $n = 38$ ; 43%) and/or orthopaedic injuries ( $n = 64$ ; 72%) in 77 patients (87%). The 30-day mortality rate was 2% with the limb-salvage rate being 98%. Six reconstructions occluded during the first week (primary/secondary patency rate: 93%/99%). After a median follow-up time of 5.1 years, 67% of the patients were followed: There were no secondary amputations and no arterial re-interventions.

**Conclusions:** Arterial repair in upper extremity BT has excellent early and long-term outcome. In contrast to a significant risk of early occlusion, limb loss after repair, late vascular re-intervention and late arterial occlusion or stenosis are rare.

## Endovascular Repair of Thoracoabdominal Aortic Aneurysms

Haulon S., D'Elia P., O'Brien N., Sobocinski J., Perrot C., Lerussi G., Koussa M., Azzaoui R. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objectives:** To evaluate the early outcomes following thoracoabdominal aortic aneurysm (TAAA) repair utilising fenestrated and branched endografts.

**Design and materials and methods:** A prospective analysis of all patients undergoing endovascular repair of TAAA in a single academic centre. All patients were deemed unfit for open surgical repair. Customised endografts were designed using CT data reconstructed on 3D workstations. Post-operatively all patients were evaluated radiologically at hospital discharge, at 6, 12, 18 and 24 months, and annually thereafter.

**Results:** Thirty-three consecutive patients (30 males) were treated over 33 months (August 2006 to April 2009). Median age and aneurysm size were 70 years (range 50–83 years) and 64 mm (range 55–100 mm) respectively. 114/116 (98%) of the targeted visceral vessels were successfully

catheterised and perfused. The in-hospital mortality rate was 9% (3/33). Transient spinal cord ischaemia was diagnosed in 4/33 (12%) patients, and permanent paraplegia in one (3%). The median follow-up period was 11 months (range 1–33 months). Endoleaks were identified in 5/33 (15%) patients: type II in four patients and a type III endoleak in one patient which required the only secondary intervention. During follow-up, two patients died: one from stroke and the other from myocardial infarction 9 and 29 months respectively after the procedure.

**Conclusion:** This preliminary study, which includes our learning curve, confirms the feasibility and safety of the endovascular repair of TAAA in high-risk patients. Meticulous follow-up to assess sac behaviour and visceral perfusion is critical in order to ensure optimal results of these complex endovascular repairs requiring numerous mating components.

#### The Proximal Fixation Strength of Modern EVAR Grafts in a Short Aneurysm Neck. An *In Vitro* Study

Bosman W.M.P.F., Steenhoven T.J.v.d., Suárez D.R., Hinnen J.W., Valstar E.R., Hamming J.F. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objectives:** The study aims to measure the strength of the proximal fixation of endografts in short and long necks.

**Design:** Three types of endografts were compared: Gore *Excluder*<sup>®</sup>, Vascutek *Anaconda*<sup>®</sup> and Medtronic *Endurant*<sup>®</sup>.

**Materials and methods:** The proximal part of the stent grafts was inserted in bovine arteries and the graft was then attached to a tensile testing machine. The force to obtain dislodgement (DF) from the aorta was recorded for each graft at proximal seal lengths of 10 and 15 mm.

**Results:** The median DF (interquartile range, IQR) for the Excluder, the Anaconda and the Endurant with a seal length of 15 mm was: 11.8 (10.5–12.0) N, 20.8 (18.0–30.1) N and 10.7 (10.4–11.3) N. With the shorter proximal seal of 10 mm, DF was, respectively: 6.0 (4.5–6.6) N, 17.0 (11.2–36.6) N and 6.4 (6.1–12.0) N.

**Conclusions:** The proximal fixation of the Anaconda is superior to the Excluder and the Endurant at short necks of 10 and 15 mm in an experimental set-up. There is a statistically significant decrease of proximal fixation for the Excluder stent graft, when decreasing the length of the proximal neck from 15 to 10 mm.

#### The Influence of Different Types of Stent Grafts on Aneurysm Neck Dynamics after Endovascular Aneurysm Repair

van Keulen J.W., Vincken K.L., van Prehn J., Tolenaar J.L., Bartels L.W., Viergever M.A., Moll F.L., van Herwaarden J.A. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objective:** Dynamic imaging provides insight into aortic shape changes throughout the cardiac cycle. These changes may be important for proximal aortic stent graft fixation, sealing and durability. The objective of this study is to analyse the influence of different types of stent grafts on dynamic changes of the aneurysm neck.

**Methods:** Pre- and postoperative electrocardiography (ECG)-gated computed tomographic angiography (CTA) scans were obtained in 30 abdominal aortic aneurysm (AAA) patients, 10 each from three different types of stent grafts (10 Talent, Endurant, and Excluder). Each dynamic CTA dataset consisted of eight reconstructed images over the cardiac cycle. Aortic area and radius changes during the cardiac cycle were determined at two levels: (A) 3 cm above and (B) 1 cm below the lowermost renal artery. Radius changes were measured over 360 axes, and plotted in a polar plot. An ellipse was fitted over the plots to determine radius changes over the major and minor axis for assessment of the asymmetric aspect and most prominent direction of distension.

**Results:** Baseline characteristics did not differ significantly between the three groups. Preoperatively, the aortic area increased significantly ( $p < 0.001$ ) over the cardiac cycle in all patients at both levels: (A) mean increase  $8.3 \pm 4.1\%$  (2.0–17.3%); (B) mean increase  $5.9 \pm 4.2\%$  (1.9–12.4%). The postoperative aortic area increase over the cardiac cycle did not differ significantly from preoperative increases: (A) mean increase  $9.9 \pm 2.2\%$  (4.4–20.0%); (B) mean increase  $7.7 \pm 2.4\%$  (3.8–12.4%). The difference between radius change over the major and minor axis was significant both pre- and postoperatively for all three stent grafts, indicating asymmetric distension. Suprarenal, the distension showed a tendency to right-anterior and infrarenal to left-anterior. The distension and direction of the aortic expansion was preserved after stent grafting. There were no differences between the three types of stent grafts regarding their impact on the aortic distension or direction of this distension.

**Conclusion:** The aorta expands significantly and asymmetrically throughout the cardiac cycle. After implantation of abdominal aortic stent grafts, the aortic distension and direction of distension remain equally preserved in all three groups. The three stent graft types studied seem to be able to adapt to the asymmetric dynamic aortic shape changes.

#### Diabetes and the Abdominal Aortic Aneurysm

Shantikumar S., Ajjan R., Porter K.E., Scott D.J.A. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objective:** The aim of this review is to delineate the association between abdominal aortic aneurysms (AAAs) and diabetes mellitus. Mechanisms for the underlying association are then discussed.

**Methods:** A systematic review of the English-language literature using PubMed, EMBASE and Cochrane databases was undertaken up to September 2009. Studies reporting appropriate prevalence data were identified and a meta-analysis performed.

**Results:** Eleven studies were identified. The prevalence of diabetes mellitus in studied patients with AAA ranged from 6% to 14%. The prevalence of diabetes in control patients without AAA ranged from 17% to 36%. Pooled analysis suggested a reduced rate of diabetes amongst people with AAA compared to those without (OR 0.65, 0.60–0.70,  $p < 0.001$ ).

**Conclusions:** Studies so far suggest a protective role for diabetes on the development of AAA. Further research is required to demarcate the underlying mechanisms for this possible association.

#### Poor Inter-observer Agreement on the TASC II Classification of Femoropopliteal Lesions

Kukkonen T., Korhonen M., Halmesmaki K., Lehti L., Tiitola M., Aho P., Lepantalo M., Venermo M. *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objectives:** This study aims to evaluate the reproducibility of femoropopliteal TASC II classification and to analyse the influence of an educational intervention on inter-observer agreement.

**Design:** This is a validation study.

**Materials:** This study included 200 consecutive angiograms of femoropopliteal arterial lesions.

**Methods:** Seven investigators evaluated the first 100 angiograms, independently aided by the available TASC guide. Thereafter, the intervention included a discussion of the 25 most problematic cases, initially by a panel of 22 vascular surgeons, and later by the seven investigators to clarify grading principles. In the second stage, the 100 remaining cases were evaluated independently. A multi-rater variation of Brennan and Prediger's free-marginal kappa ( $\kappa_{free}$ ) was used to calculate inter-observer agreement.

**Results:** There were lesions not fitting any of the TASC classes. Total agreement among all seven investigators was reached in 7% and 19% of the cases before and after the intervention, respectively. In the first stage,  $\kappa_{free}$  was 0.32 between all observers (range between two observers  $\kappa_{free} = 0.11$ –0.54). The intervention increased the agreement to  $\kappa_{free} = 0.49$  (range: 0.20–0.56). Agreement between the two observers was 38–69% (mean 49%) before the intervention and 51–73% (mean 61%) thereafter.

**Conclusions:** TASC II classification for femoropopliteal lesions allows individual interpretations, and the common use of this classification as a basis for decision making and reporting outcomes could therefore be questioned.

#### Modified Ankle-brachial Index Detects More Patients at Risk in a Finnish Primary Health Care

Oksala N.K.J., Viljamaa J., Saimanen E., Venermo M., on behalf of the ATTAC study group *Eur J Vasc Endovasc Surg* 2010;30:in press

**Objectives:** Despite peripheral arterial disease (PAD), defined as ankle-brachial index (ABI)  $\leq 0.9$ , being an independent predictor of cardiovascular morbidity and mortality, it is rarely used in the primary care. Various definitions for PAD (i.e., ABI  $\leq 0.9$  or ABI  $\leq 0.95$ ) exist. In addition, a modified ABI (ABI<sub>mod</sub>) using the lowest ankle pressure improves identification of patients at risk. The prevalence of PAD in primary care and association of different ABI calculations with atherosclerotic disease burden is not known.

**Design:** The research was conducted as a prospective cross-sectional study. Finnish health centres and 99 general practitioners were selected and trained for ABI measurement. Consecutive patients were recruited using inclusion criteria: age 50–69 years and one or more cardiovascular risk factors or age  $\geq 70$  years or calf pain during exercise. A total of 817 patients were recruited.

**Methods:** Research methods included interview and Doppler measurement of brachial and ankle pressures.

**Results:** An ABI<sub>mod</sub>  $\leq 0.9$  yielded the highest prevalence of PAD (47.7%), had the best sensitivity and identified the highest number of patients with coronary artery disease (CAD), cerebrovascular disease (CVD), PAD, CAD/CVD/PAD and polyvascular disease (PVD) at the cost of reduced specificity. All ABI calculations were independently associated with atherosclerotic disease burden. Interestingly, ABI  $\geq 1.4$  had the strongest association with CVD.

**Conclusions:** PAD is highly prevalent among patients presenting to primary care. ABI<sub>mod</sub> calculation detects more number of patients at risk at the cost of reduced specificity. The association of high ABI with CVD noted in this study warrants future research for validation.