

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

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## Hybrid Aortic Arch Repair Procedure: Reinforcement of the Aorta for a Safe and Durable Landing Zone

Gelipi G., Vanelli P., Mangini A., Danna P., Contino M., Antona C. *Eur J Vasc Endovasc Surg* 2010;40:712-7.

**Objectives:** Hybrid aortic arch repair procedure was introduced to reduce invasiveness in high-risk patients with aortic arch pathology. The good results are expanding its application, but endoleak, particularly type I, remains its Achilles' heel.

**Design:** We describe our experience with hybrid treatment of aortic arch diseases focussing on techniques and results to avoid type I endoleak.

**Materials and Methods:** A total of 15 high-risk patients with zone 0–2 aortic arch pathology underwent supra-aortic debranching on ascending aorta and proximal aortic arch reinforcement with a Dacron prosthesis. Metachronously, the procedure was completed with endovascular stent grafting (ESG).

**Results:** Median age was 70 years with a mean European System for Cardiac Operative Risk Evaluation (EuroSCORE) of  $12.7 \pm 6.8$ . One patient died between aortic debranching and ESG. Mean time between surgical debranching and ESG was  $32 \pm 27.7$  days. No major neurological events occurred. Mean length of the landing zone for ESG was  $3.8 \pm 0.8$  cm. Computed tomography (CT) angiography scan performed soon after operation, and at 3, 6, and 12 months did not show any type I endoleak.

**Conclusions:** Supra-aortic debranching on ascending aorta with proximal aortic arch reinforcement is a useful step to ensure a safe landing zone for ESG, reducing risk early to midterm of endoleak. Longer term follow-up is required to confirm the viability of this technique.

## Hybrid Repair of the Aortic Arch in Patients with Extensive Aortic Disease

Antoniou G.A., Mireskandari M., Bicknell C.D., Cheshire N.J.W., Gibbs R.G., Hamady M., Wolfe J.H.N., Jenkins M.P. *Eur J Vasc Endovasc Surg* 2010;40:718-24.

**Objective:** To evaluate the outcome of hybrid treatment of the aortic arch with supra-aortic debranching and endovascular stent-graft repair in a selected group of patients with complex disease.

**Design:** Case series study with retrospective analysis of prospectively collected non-randomised data.

**Methods:** Patients with hybrid repair of complex arch disease at a single centre over a 6-year period were enrolled in the study. Only patients with extensive arch pathologies requiring debranching of at least the left carotid artery were considered. Patients were divided into those who underwent complete and partial supra-aortic revascularisation. The  $\chi^2$  test was used to evaluate differences in outcomes. Logistic regression analyses were applied to identify predictors of poor outcome.

**Results:** A total of 33 patients were included in the study. Complete and partial arch repair was performed in nine and 24 patients, respectively. The aortic disease extended to the thoracic and abdominal aorta in 39% and 52% of the patients, respectively. One-third of the patients (30%) were treated on an urgent/emergency basis. Elective 30-day mortality and morbidity rates were 13% and 35%, respectively. Early mortality was significantly higher in the complete arch repair group ( $p = 0.046$ ). Pre-existing renal impairment was identified as a poor prognostic factor. All extra-anatomic bypasses remained patent and no aortic disease-related deaths occurred during a mean follow-up period of 23 months (range, 1.5–58 months). Complete arch repair was associated with an increased incidence of late endoleak ( $p = 0.018$ ).

**Conclusions:** Hybrid treatment of the aortic arch provides a feasible alternative treatment in patients who are high risk for conventional open surgical repair. Careful selection of patients is required to achieve satisfactory results.

## The Incidence of Spinal Cord Ischaemia Following Thoracic and Thoracoabdominal Aortic Endovascular Intervention

Drinkwater S.L., Goebells A., Haydar A., Bourke P., Brown L., Hamady M., Gibbs R.G.J. On behalf of the Regional Vascular Unit, St Mary's Hospital, Imperial College NHS Trust. *Eur J Vasc Endovasc Surg* 2010;40:732-8.

**Objectives:** To determine the incidence and risk factors for spinal cord ischaemia (SCI) following thoracic and thoracoabdominal aortic intervention.

**Methods:** A prospective database of all thoracic and thoracoabdominal aortic interventions between 2001 and 2009 was used to investigate the incidence of SCI. All elective and emergency cases for all indications were included. Logistic regression was used to investigate which factors were associated with SCI.

**Results:** 235 patients underwent thoracic aortic stent grafting; 111 (47%) thoracic aortic stent-grafts alone, with an additional 14 (6%) branched or fenestrated thoracic grafts, 30 (13%) arch hybrid procedures and 80 (34%) visceral hybrid surgical and endovascular procedures. The global incidence of SCI for all procedures was 23/235 (9.8%) and this included emergency indications (ruptured TAAA and acute complex dissections) but the incidence varied considerably between types of procedures. Of the 23 cases, death occurred in 4 patients but recovery of function was seen in 6. Thus, permanent paraplegia occurred in 13/235 (5.5%) patients. Of the nine pre-specified factors investigated for association with SCI, only percentage of aortic coverage was significantly associated with the incidence of SCI; adjusted odds ratio per 10% increase in aorta covered = 1.78 [95% CI 1.18–2.71],  $p = 0.007$ . The procedures in patients who developed SCI took longer (463.5 versus 307.2 minutes) and utilised more stents (4 versus 2).

**Conclusion:** SCI following thoracic and thoracoabdominal aortic endovascular intervention is associated with the proportion of aorta covered. The degree of risk varies between different types of procedure and this should be carefully considered in both selection and consenting of patients.

## Prognosis of Vascular Surgery Patients Using a Quantitative Assessment of Troponin T Release: Is the Crystal Ball still Clear?

Winkel T.A., Schouten O., Hoeks S.E., Voûte M.T., Chonchol M., Goci D., Flu W.-J., van Kuijk J.-P., Lindemans J., Verhagen H.J.M., Bax J.J., Poldermans D. *Eur J Vasc Endovasc Surg* 2010;40:742-9.

**Background:** Cardiac troponin T (cTnT) assays with increased sensitivity might increase the number of positive tests. Using the area under the curve (AUC) with serial sampling of cTnT an exact quantification of the myocardial damage size can be made. We compared the prognosis of vascular surgery patients with integrated cTnT-AUC values to continuous and standard 12-lead electrocardiography (ECG) changes.

**Methods:** 513 Patients were monitored. cTnT sampling was performed on postoperative days 1, 3, 7, 30 and/or at discharge or whenever clinically indicated. If cTnT release occurred, daily measurements of cTnT were performed, until baseline was achieved. CTnT-AUC was quantified and divided in tertiles. All-cause mortality and cardiovascular events (cardiac death and myocardial infarction) were noted during follow-up.

**Results:** 81/513 (16%) Patients had cTnT release. After adjustment for gender, cardiac risk factors, and site and type of surgery, those in the highest cTnT-AUC tertile were associated with a significantly worse cardiovascular outcome and long-term mortality (HR 20.2; 95% CI 10.2–40.0 and HR 4.0; 95% CI 2.0–7.8 respectively). Receiver operator analysis showed that the best cut-off value for cTnT-AUC was  $<0.01$  days\*ng m for predicting long-term cardiovascular events and all-cause mortality.

**Conclusion:** In vascular surgery patients quantitative assessment of cTnT strongly predicts long-term outcome.

## The Efficacy of a New Stimulation Technology to Increase Venous Flow and Prevent Venous Stasis

Griffin M., Nicolaides A.N., Bond D., Geroulakos G., Kalodiki E. *Eur J Vasc Endovasc Surg* 2010;40:769-74.

**Objectives:** Electrical stimulation of calf muscles has been shown to be effective in prevention of DVT. The aim was to determine: (a) dependence of venous blood velocity and ejected volume on the rates of stimulated calf contractions; (b) clinical factors affecting efficacy in healthy individuals.

**Methods:** The maximum intensity stimulus tolerated was applied to calves of 24 volunteers. In popliteal veins, Peak Systolic Velocities (PSV), ejected volume per individual stimulus (Stroke Volume SV) and ejected Total Volume Flow per minute (TVF) of expelled blood were determined using ultrasound. Stimulation rates from 2 to 120 Beats Per Minute (bpm) were applied.

**Results:** Mean baseline popliteal PSV was 10 cm/s. For stimulation rates between 2 and 8 bpm, the PSV was 10 times higher and reached 96–105 cm/s. Stroke volume (SV) per individual stimulus decreased in a similar fashion. With increasing rates of stimulation the TVF increased by a factor of 12 times (from 20 ml/min to 240 ml/min).