

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

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Identification of Skills Common to Renal and Iliac Endovascular Procedures Performed on a Virtual Reality Simulator

Neequaye S.K., Aggarwal R., Brightwell R., Van Herzele I., Darzi A., Cheshire N.J.W. *Eur J Vasc Endovasc Surg* 2007;33:525-32.

Introduction There is a learning curve in the acquisition of endovascular skills for the treatment of vascular disease. Integration of Virtual reality (VR) simulator based training into the educational training curriculum offers a potential solution to overcome this learning curve. However evidence-based training curricula that define which tasks, how often and in which order they should be performed have yet to be developed. The aim of this study was to determine the nature of skills acquisition on the renal and iliac modules of a commercially-available VR simulator.

Method 20 surgical trainees without endovascular experience were randomised to complete eight sessions on a VR iliac (group A) or renal (group B) training module. To determine skills transferability across the two procedures, all subjects performed two further VR cases of the other procedure. Performance was recorded by the simulator for parameters such as time taken, contrast fluid usage and stent placement accuracy.

Results During training, both groups demonstrated statistically significant VR learning curves: group A for procedure time ($p < 0.001$) and stent placement accuracy ($p = 0.013$) group B for procedure time ($p < 0.001$), fluoroscopy time ($p = 0.003$) and volume of contrast fluid used ($p < 0.001$). At crossover, subjects in group B (renal trained) performed to the same level of skill on the simulated iliac task as group A. However, those in group A (iliac trained) had a significantly higher fluoroscopy time (median 118 vs 72 secs, $p = 0.020$) when performing their first simulated renal task than for group B.

Conclusion Novice endovascular surgeons can significantly improve their performance of simulated procedures through repeated practice on VR simulators. Skills transfer between tasks was demonstrated but complex task training, such as selective arterial cannulation in simulators and possibly in the real world appears to involve a separate skill. It is thus suggested that a stepwise and hierarchical training curriculum is developed for acquisition of endovascular skill using VR simulation to supplement training on patients.

Comparison of Mortality Prediction Models after Open Abdominal Aortic Aneurysm Repair

Hadjianastassiou V.G., Tekkis P.P., Athanasiou T., Mukhtadir A., Young J.D., Hands L.J. *Eur J Vasc Endovasc Surg* 2007;33:536-43.

Objectives Comparison of the accuracy of prediction of contemporary mortality prediction models after open Abdominal Aortic Aneurysm (AAA) surgery.

Methods Post-operative data were collected from AAA patients from 2 UK Intensive Care Units (ICU). POSSUM and VBHOM based models were compared to the APACHE-AAA model which was able to adjust for the hospital-related effect on outcome. Model performance was assessed using measures of calibration, discrimination and subgroup analysis.

Results 541 patients were studied. The in-hospital mortality rate for elective AAA repair (325 patients) was: 6.2% (95% confidence interval (c.i.) 3.5 to 8.8) and for emergency repair (216 patients) was: 28.7% (95% c.i. 22.5-34.9). The APACHE-based model had the best overall fit to the whole population of AAA patients, and also separately in elective and emergency patients. The V-POSSUM physiology-only ($p < 0.001$) and VBHOM ($p = 0.011$) models had a poor fit in elective patients. The RAAA-POSSUM physiology-only ($p < 0.001$) and VBHOM models ($p = 0.010$) had a poor fit in emergency patients.

Conclusions The APACHE-AAA model with its ability to adjust for both the hospital-related "effect" as well as the patient case-mix, was a more accurate risk stratification model than other contemporary models, in the post-operative AAA patient managed in ICU.

Myocardial Damage in High-risk Patients Undergoing Elective Endovascular or Open Infrarenal Abdominal Aortic Aneurysm Repair

Schouten O., Dunkelgrun M., Feringa H.H.H., Kok N.F.M., Vidakovic R., Bax J.J., Poldermans D. *Eur J Vasc Endovasc Surg* 2007;33:544-9.

Objective Dobutamine stress echocardiography (DSE) provides an objective assessment of the presence and extent of coronary artery disease. Therefore we compared cardiac outcome in patients at high-cardiac risk undergoing open or endovascular repair of infrarenal AAA using preoperative DSE results.

Methods Consecutive patients with ≥ 3 cardiac risk factors (age > 70 years, angina pectoris, myocardial infarction, heart failure, stroke, renal failure, and diabetes mellitus) undergoing infrarenal AAA repair were reviewed retrospectively. All underwent cardiac stress testing using DSE. Postoperatively data on troponin release and ECG were collected on day 1, 3, 7, before discharge, and on day 30. The main outcome measures were perioperative myocardial damage and myocardial infarction or cardiovascular death.

Results All 77 patients (39 endovascular, 38 open) had a history of cardiac disease. The number and type of cardiac risk factors were similar in both groups. Also DSE results were similar: 55 vs 56%, 24 vs 28%, and 21 vs 18% had no, limited, or extensive stress induced myocardial ischemia respectively. The incidence of perioperative myocardial damage (47% vs 13%, $p = 0.001$) and the combination of myocardial infarction or cardiovascular death (13% vs 0%, $p = 0.02$) was significantly lower in patients receiving endovascular repair.

Conclusion In patients with similar high cardiac risk, endovascular repair of infrarenal aortic aneurysms is associated with a reduced incidence of perioperative myocardial damage.

Different Disease Profiles for Women and Men with Abdominal Aortic Aneurysms

Hultgren R., Granath F., Swedenborg J. *Eur J Vasc Endovasc Surg* 2007; 33:556-60.

Objective The overall aim with this study was to investigate causes of death and mortality rates for women and men treated for abdominal aortic aneurysm (AAA) in Sweden.

Materials and method All patients treated for ruptured and non-ruptured AAA 1987-2002 in Sweden were identified in national registries ($n = 12917$). Age, sex, diagnosis, surgical procedure and mortality were analysed on a patient specific level. Logistic regression and analysis of standardised mortality rates (SMR) were performed.

Results Post operative mortality was similar between the sexes. Age ($p < 0.0001$), and surgery for rupture ($p = 0.0005$), but not gender ($p = 0.65$) were significant risk factor for poor long term survival. SMR revealed increased risk for both sexes compared to the population with significantly higher values for women than men (2.26, CI 2.10-2.43 vs. 1.63, CI 1.57-1.68, $p < 0.0001$). The higher risk for women could be explained by the higher risk for aneurysm related death (ie.thoracic or abdominal aorta) compared to men (Hazard ratio 1.57 vs. 1.0, $p < 0.0001$).

Conclusion Women do not have an increased surgical risk compared to men, but treated women have an increased risk of premature death compared to men and women in the population. They also have a higher risk for aneurysm related death compared to men with AAA.

Negative Association between Infra-renal Aortic Diameter and Glycaemia: The Health In Men Study

Le M.T.Q., Jamrozik K., Davis T.M.E., Norman P.E. *Eur J Vasc Endovasc Surg* 2007;33:599-604.

Objective There is evidence of a negative association between diabetes and abdominal aortic aneurysm (AAA). The aim of this study was to assess whether there is a similar relationship between both diabetes and glucose level, and infra-renal aortic diameter throughout its range.

Design and methods Infra-renal aortic diameter was measured using ultrasound in 12,203 men aged 65-83 years as part of a trial of screening for AAA. A range of cardiovascular risk factors were also assessed. In a follow-up study, fasting serum glucose was measured in 2,859 non-diabetic men. Aortic diameter was logarithmically transformed and treated as both a continuous and categorical variable in stepwise multivariate linear and logistic models.

Results The median aortic diameter was slightly smaller in the diabetic men (21.3 ± 3.9 vs 21.6 ± 3.8 , $P < 0.0001$). There was an independent negative association between diabetes and AAA (OR 0.79, 95% CI: 0.63, 0.98), and an inverse correlation (Coefficient: -0.0064 , $p = 0.0024$) between fasting glucose and aortic diameter in non-diabetic men.

Conclusions Diabetes is inversely associated with both AAA and aortic diameter in men over 65 years. This association is independent of other risk factors for AAA. Aortic diameter also has an inverse relationship with fasting glucose concentrations in men without diabetes.