PATEY PRIZE 2

O8 NOT PRESENTING – moved to HPB Session

O9 COMPARATIVE ANALYSIS OF REEPITHELIALISATION IN PARTIAL THICKNESS BURN AND EXCISIONAL WOUNDS OF SIMILAR DEPTH

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Introduction: Re-epithelialisation of cutaneous wounds is a complex multistep process. In partial thickness wounds, keratinocytes from wound edges and the remnants of the epidermal appendages contribute to the process. We investigated whether the mechanism of injury had any influence on re-epithelialisation of partial thickness wounds in a porcine model.
Method: Partial thickness wounds were created on the back of anaesthetized Hampshire pigs using either a thermo-regulated block (burn) or a dermatome (excisional). Wounds and unwounded skin were harvested at 7, 14, 29, 44, 57 and 70 days post-wounding and processed for routine histology. Neoepidermal thickness, length and number of hair follicles in the dermis were measured. Data were analysed using non-parametric tests with a significant p value of <0.05.
Result: Re-epithelialisation was significantly faster in excisional wounds compared to burn wounds at day 7 post-wounding (81% versus 22% of the wound length). The number of hair follicles in the underlying dermis of excisional wounds was high at day 7 but interestingly, by day 14, it had increased by 1.5 times in burn wounds compared to excisional wounds. Neoepidermal thickness was similar in both wounds at day 7. However on day 70 post-injury, neoepidermis of burn wound was significantly thicker than that of excisional wound and the number of hair follicles was similar.
Conclusion: Re-epithelialisation of a wound is influenced by the nature of injury. This study provides evidence for managing burn and donor site wounds effectively. Importantly it emphasises the need for testing novel dressings based on mechanism of injury.

Take-home message:
Re-epithelialisation of cutaneous wounds is influenced by the type of injury.

O10 REPORTING INDIVIDUAL SURGEON OUTCOMES DOES NOT AFFECT NUMBER AND CHARACTERISTICS OF ABDOMINAL AORTIC ANEURYSMS OFFERED TREATMENT IN THE UK

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Introduction: Reporting surgeons' outcomes has been recently introduced in the UK. This has the potential to result in surgeons becoming risk-averse. We aimed to investigate whether reporting outcomes for Abdominal Aortic Aneurysm (AAA) surgery impacted on the number and risk-profile of patients offered elective-treatment.
Method: The number and characteristics of patients referred for consideration of elective-repair in one tertiary-unit were analysed yearly between 2010-2014 (University Hospital Coventry and Warwickshire; UHCW). Cardiopulmonary-exercise test (CPET) results were assessed; clinic, casualty and theatre event-codes were searched to obtain all AAAs treated. Subsequently, publically available National Vascular Registry (NVR) data were used to compare the number of AAAs treated in the 91 units that reported outcomes in 2013 (period: 2008-2012) and 2014 (2009-2013) and the 86 units reporting AAA-outcomes in 2013, 2014 and 2015 (2010-2014).
Result: The percentage of patients offered elective AAA repair increased from 56% in 2010 to 65% in 2014, with a maximum of 78% in 2013 in UHCW. The age, AAA size and CPET results for those offered elective treatment did not differ significantly during the five-year period. Only four patients underwent emergency surgery after having been found "unfit" for elective-repair. Between 2009 and 2013 the number of AAAs treated per unit increased by two cases per year ($p=0.01$) compared to 2008-2012; a further increase of one AAA per year was seen between 2010-2014.
Conclusion: Our results do not support the assumption that reporting individual surgeon outcomes is associated with a risk-averse strategy regarding patient selection.

Take-home message:
Reporting individual surgeon outcomes in vascular surgery does not seem to impact on the number of aortic aneurysms or the characteristics of patients offered surgical treatment at present.

O11 DIFFERENTIAL IN VITRO REACTIVITY OF MESENTERIC AND RENAL ARTERIES TO CHANGES IN PH AND CHLORIDE CONCENTRATION

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Introduction: Large volume infusions of 0.9% saline are associated with the development of hyperchloraemia, persistent acidosis and impaired renal function. The relationship between these changes is unclear. We have independently compared the effect of pH and elevated chloride ions concentration on the vasoconstrictor responses of porcine renal and mesenteric arteries in vitro.
Method: Isometric tension recordings of porcine isolated mesenteric and renal arteries (2 mm internal diameter) were conducted in modified Krebs-Henseleit solution containing 105 mM chloride ions maintained at pH 7.2 and 7.4 (modification of bicarbonate and chloride ions with gluconate ions). The potency of KCl and noradrenaline was assessed by the pD2 (logarithm of concentration causing 50% of maximum response) and effect of a 12mM increase in chloride ions (NaCl) evaluated in the presence of the thromboxane-mimetic U46619.
Result: Concentration-dependent contractions to KCl (pD2 - 1.41±0.02 and 1.47±0.01, n=8) and noradrenaline (pD2 - 5.43±0.11 and 5.13±0.02, n=8) were significantly reduced ($p<0.05$ paired Student t-test) in potency by a reduction in pH from 7.4 to 7.2. In contrast, contractions to KCl (pD2 - 1.60±0.08 and 1.52±0.04, n=5) and noradrenaline (pD2 - 5.80±0.08 and 5.7±0.07, n=11) in the renal artery were not affected by a reduction in pH. In the renal artery 12 mM NaCl caused a significant 18.3±4.5% (n=9) increase in U46619-induced vasoconstrictor tone, but had no effect (-4.0±5.3%, n=6) in the mesenteric artery.
Conclusion: Based on the above data that the combination of acidosis and supraphysiological elevation in chloride concentration has the potential to selectively compromise renal blood flow but not mesenteric blood flow.

Take-home message:
This study provides mechanistic insights into the deleterious effects of hyperchloraemia and acidosis on the renal vasculature.

O12 MENTAL IMAGERY WITH 3D VISUAL AIDS AUGMENTS SURGICAL PERFORMANCE

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Introduction: Mental imagery refers to visualising the performance of a task prior to physically executing it. Evidence from clinical psychology, music and performing arts demonstrates that engaging in such a process augments the subsequent task performance. Our study aims to assess the impact of mental rehearsal (MR) with interactive patient specific 3D imagery, on laparoscopic surgery performance.
Method: 15 laparoscopic cholecystectomy novices were matched into two groups in a 2:1 ratio. Group 1 (n=10) performed a simulated laparoscopic cholecystectomy on a virtual reality (VR) simulator after watching a didactic video of a real procedure. Group 2 (n=5) performed the same procedure after structured mental rehearsal with an interactive 3D visual aid. The anatomical features were modified to resemble the anatomy of the simulated model. Performance and safety variables were obtained from the VR simulator database after each procedure and compared between the two groups.
Result: Trainees who performed mental imagery had significantly less total number of movements (Group 2 median 553, Group 1 1391.5, $p=0.005$) and total path length of instrument tip (Group 2 mean 1540.24, Group 1 mean 2837 $p=0.007$). Furthermore, trainees in group 2 performed the procedure significantly faster than the trainees in Group 1 (Group 2 median 667s, Group 1 mean 1283, $p=0.003$). There was no statistical difference in the safety metrics (number of perforations $p=0.07$, non-cauterised bleeding $p=0.114$, damage to vital structures $p=0.529$).
Conclusion: From this pilot data there are strong indications that MR using 3D patient specific models can enhance surgical performance.

Take-home message:
Pre-operative mental rehearsal using 3D patient specific models may enhance surgical performance.

O13 THE DEVELOPMENT OF A NANOCOMPOSITE AURICULAR IMPLANT WITH ADIPOSE STEM CELLS FOR CLINICAL TRANSLATION.

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Introduction: Current surgical reconstruction of auricular defects involves harvesting rib cartilage and carving a new cartilaginous framework. However, this 'gold standard' technique causes pain, donor site morbidity and is restricted by cartilage availability. The use of alternative synthetic materials is also limited due to the complications relating to poor tissue integration and angiogenesis, leading to extrusion and infection. We aim to meet this clinical challenge by creating a new material for auricular reconstruction using a novel nanocomposite polymer called polyhedral oligomeric silsesquioxane

poly(carbonate urea) urethane (POSS-PCU), which has already been successfully taken to the clinical benchside as a replacement trachea, tear duct and vascular by-pass graft.
Method: The chemical, structural and mechanical properties of POSS-PCU has been optimised and characterized to ensure it is suitable for auricular reconstruction. The biocompatibility of POSS-PCU has been tested with several human cell lines and levels of angiogenesis, tissue integration and immune response has been explored using in vivo animal models.
Result: POSS-PCU was found to support cell adhesion, proliferation and extracellular matrix formation of human dermal fibroblasts, endothelial cells, chondrocytes and adipose stem cells, using QT-PCR and immunocytochemistry. The subcutaneous implantation of POSS-PCU in rodent models demonstrated good tissue integration and vessel formation over 3 months without infection and extrusion.
Conclusion: POSS-PCU has shown to be a promising material for auricular reconstruction. Preclinical testing will be completed in the near future prior to embarking on a UK multicenter clinical trial.

Take-home message:
The POSS-PCU nanocomposite polymer is a promising material for auricular reconstruction and will be tested in preclinical trials before embarking on a UK clinical trial

O14 ALPHA-2-ANTIPLASMIN ACTIVITY IS INCREASED IN PATIENTS WITH AAA

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Introduction: Clot architecture is altered in patients with abdominal aortic aneurysms (AAA) and changes in fibrinolysis are evident in the early stages of disease. Alpha-2-antiplasmin (α2AP), a direct inhibitor of plasmin, is involved in the regulation of fibrinolysis. α2AP circulates in plasma as both an intact molecule and a C-terminally cleaved form, which is a less efficient inhibitor of plasmin. α2APinactivates plasmin, forming plasmin-antiplasmin-complexes (PAPs). We aimed to study α2AP in AAA patients and controls.
Method: Levels of total α2AP, C-terminally cleaved α2AP and PAPs were measured using ELISAs in 116 AAA patients (median aortic size 4.9(3.9-8.3)cm) and 120 controls (aorta 1.8 (1.2-2.9)cm). The frequencies of the α2AP Arg6Trp and Arg407Lys polymorphisms were determined using Taqman genotyping probes and RT-PCR. Data was analyzed using Mann-Whitney U test and expressed as median(interquartile range).
Result: Age was not significantly different between the two groups. Total plasma α2AP was higher in AAA patients than controls(101vs92 AU/dl, P=0.004). The percentage of C-terminally cleaved α2AP was higher in AAA patients (66%vs36%, P<0.001). The PAP level was higher in AAA patients (715vs512, P<0.001). There was an association between both the Arg407Lys and the Arg6Trp polymorphisms and total plasma α2AP(P=0.001) in AAA patients.
Conclusion: Higher levels of C-terminally cleaved α2AP, total plasma α2AP and PAP are found in AAA patients. These data are indicative of chronically increased plasmin generation in AAA. It may also explain the delay in lysis that can be seen in the ex-vivo fibrin clots of patients with AAA.

Take-home message:
Higher levels of C-terminally cleaved α2AP, total plasma α2AP and PAP are found in AAA patients. These data are indicative of increased fibrinolytic activity in AAA.