

ORAL PRESENTATIONS 3B

FUTURE PROJECTS (1)

O81 THE RIGHT COLIC ARTERY - AN ANATOMICAL DEMONSTRATION AND ITS RELEVANCE IN THE LAPAROSCOPIC ERA

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Introduction: Right hemi-colectomy is commonly undertaken for benign and malignant disease. However, we currently do not tailor the procedure in cancer resections based on the lymphovascular anatomy despite significant variation in the incidence and origin of the right colic artery. It is proposed that modern laparoscopic removal of the relevant lymphovascular package and associated cancer instead of the entire right colon (as seen in a traditional right hemi-colectomy) may lead to better outcomes. We aimed to demonstrate the incidence and variation of the right colic artery in a cadaveric study.

Study design: We dissected 9 formalin and 2 soft-fix cadavers under a departmental head of anatomy. In each case the right colic artery was dissected to establish its origin. Pilot data: 11 cadavers were dissected (6 male, 5 female). The median age was 83 years (range from 58 to 95 years). The right colic artery originated from the right branch of the middle colic artery in 7 cases. It arose directly from the superior mesenteric artery in 2 cases, from the root of the middle colic artery in 1 case, and was absent in 1 individual. Forward plan: Contrary to the literature, we did not find the right colic arising from the ileo-colic artery, but other variations were seen. We will undertake dissection of another 15 cadavers in December 2015 to more comprehensively characterise the anatomical variation of the right colic artery. This will lend critical support to the argument for laparoscopic segmental resections in both benign and malignant disease.

Take-home message:

Laparoscopic segmental resection of the right colon for benign and malignant disease may lead to better patient outcomes but must be based upon a sound anatomical understanding of the variation of the right colic artery and lymphovascular package associated with the tumour.

O82 THE ROLE OF DNA METHYLATION IN THE PATHOLOGY OF ABDOMINAL AORTIC ANEURYSMS

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Introduction: Abdominal aortic aneurysm (AAA) is a degenerative cardiovascular disease characterised by the gradual, irreversible dilation of the abdominal aorta. Genetics plays a significant role in the development of AAA yet only a small number of low effect risk loci have been identified. It is feasible that DNA methylation, one cause of altered gene regulation, may contribute to the overall susceptibility of disease.

Study design: This project will investigate changes in gene promoter methylation in candidate genes as a pathogenic mechanism of AAA. Gene-targeted bisulphite sequencing will be used to identify methylation changes in a case-control cohort from our AAA DNA resource and determine associations between methylation and AAA/AAA size in peripheral blood mononuclear cells (PBMCs) and aortic vascular cells. PBMCs from healthy people will be used to determine the relationship between methylation and gene expression in our candidate genes. Pilot data Global DNA methylation was quantified from PBMCs of 93 male patients with AAA and 92 matched male controls using an enzyme immuno-assay. Global DNA methylation was higher in patients with large AAA (1.86% (SD:0.6%)) compared to controls (0.79% (SD:0.43%)) ($P < 0.0001$). For all patients with AAA there was a linear relationship between global DNA methylation and AAA size ($r^2 = 0.32$, $P < 0.0001$). Forward plan If a common epigenetic switching process contributes to AAA growth, it will have implications for the underlying pathology of disease and future pharmaco-therapeutic strategies. Epigenetic therapies are already being designed to target pathogenic methylation changes in atherosclerosis and hypertension. These could apply to AAA in the future.

Take-home message:

DNA methylation is associated with AAA, and further investigation may reveal a more informative role for methylation in disease development/growth. These findings may have implications for the future treatment strategy of AAA.

O83 PELVEX COLLABORATIVE GROUP - INTERNATIONAL REGISTRY OF PELVIC EXENTERATIVE SURGERY

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Introduction: Locally advanced pelvic cancer if untreated has a median survival of less than one-year. Multivisceral pelvic exenterative surgery offers the best chance of cure and long-term survival for both locally advanced and recurrent cancer. To date, there is limited evidence on surgical and survival outcomes, with the majority of current evidence based on retrospective or single-centre reports. Study **Study Design:** PelvEx is an online website with the objective to collect data from international centres to prospectively analyze the treatment, complications and outcomes relating to exenterative surgery (surgical and survival outcomes). The collaboration is open to all centres across the world that provides pelvic exenterative surgery, with the aim to facilitate large-scale, best management strategies for pelvic neoplasm. Pilot data: Currently, we have already performed a review on locally advanced and recurrent rectal cancer (>1,600 patients) from data provided by twenty international centres. The preliminary data is being analyzed and will be disseminated back to all participating centres. Forward Plan: Our forward plan is to increase the number of participating centres with the aim to generate best practice guidelines and help establish effective future trials regarding the management of advanced/recurrent pelvic malignancies. Additionally, we strive to improve the current knowledge basis for patients and surgeons based on internationally robust data so as to facilitate well-informed decision-making and treatment plans.

Take-home message:

Large collaborative networks are key for best evidence standards and help to ensure up-to-date management strategies and guidelines.

O84 IMPROVING PERFUSION FLUID FOR THE NEXT GENERATION OF TRANSPLANTS: A PROPOSAL TO USE AGENTS THAT HAVE BEEN FOUND TO LOWER CELLULAR OXYGEN CONSUMPTION TO REDUCE TISSUE HYPOXIA

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Introduction: As the need for transplantation increases, the boundaries of what is a marginal organ is being pushed further back. The development of appropriate perfusion fluid has greatly helped in maximising available organs through reducing the effects of unavoidable tissue hypoxia. We believe we can improve this further.

Study design: University of Wisconsin solution containing agents identified as being able to reduce cellular oxygen consumption will be compared to untreated solution. Initially, murine kidneys will be harvested and subjected to perfusion as standard practice and transplanted. Biopsies will be taken periodically for histological analysis. Graft outcome and function will be used as measures of comparison. A phase II trial will follow if these results are promising. Pilot data A variety of agents originally identified through our studies on improving tumour hypoxia have shown a reduction in oxygen consumption in malignant and non-malignant cells alike, which has been demonstrated to lead to an increase in oxygen availability and hypoxia improvement. This has been shown in monolayer and 3D in vitro models. We hypothesise that by reducing cellular oxygen consumption, cells will be able to withstand hypoxia for a greater period of time and thus lengthen the preservation period. Forward plan (including how it might impact on patients) If the data shown in our work in cancer can be replicated in the transplant setting, we can potentially increase the donor pool by enhancing the preservation period of an organ. Ultimately, this will help reduce the waiting time for patients and improve morbidity.

Take-home message:

The preservation period of an organ can potentially be increased through using agents that reduce oxygen consumption. This will improve graft function and increase the donor pool.

O85 MEAN ARTERIAL PRESSURE SHOWS POOR CORRELATION WITH CONTRAST ENHANCED ULTRASOUND ASSESSED VISCERAL BLOOD FLOW

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Introduction: Mean arterial pressure (MAP) and cardiac output (CO) monitoring are used to help guide organ perfusion and measure global blood flow. Measurement of microvascular visceral blood flow (MVBF) is arguably of greater clinical relevance. Meta-analyses suggest cardiac output optimisation reduces surgical morbidity. This study aims to track changes in MVBF across a range of MAP and CO generated via the administration of common vasoactive drugs. Contrast-enhanced ultrasound (CEUS) provided a validated measure of MVBF.

Study Design: Following ethical approval, sixteen healthy male volunteers will be recruited. Heart rate and non-invasive blood pressure were recorded and stroke volume measured using ODM (CardioQ™). 5-95% Rise Time (RT) in the kidney and liver was determined using CEUS with contrast bolus doses of Sonovue® (Sulphur-hexa-fluoride microbubbles). Alterations in MAP and CO were achieved by administration of phenylephrine and e-phedrine with measurements taken before and after drug administration. Data was extracted using Qlab (Philips). Data was assessed for normality and analysed

using ANOVA with Tukey post-hoc analysis; correlation assessed via Pearson rank. Pilot data: Interim data of eleven volunteers demonstrates a correlation in hepatic and renal circulation between ODM assessed cardiac output and RT ($r^2=0.16$, $p=0.01$), ($r^2=0.25$, $p<0.01$), but not with MAP ($r^2=0.01$, $p=0.68$), ($r^2=0.01$, $p=0.66$). Forward Plan: This work in progress suggests that MAP is a poor indicator of MVBF within the abdominal viscera in healthy volunteers and should be used with caution as a surrogate marker of perfusion. A follow up intraoperative study in colorectal surgery is currently underway.

Take-home message:

MAP does not correlate with contrast-enhanced ultrasound assessed abdominal visceral microvascular blood flow.

O86 THE R-3D-2 STUDY - RANDOMISED CONTROLLED TRIAL ON THE IMPACT OF SURGICAL REHEARSAL STRATEGIES IN RECTAL CANCER SURGERY USING 3D MODELS BY USING 2 METHODS

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Introduction: The gold standard surgical treatment for rectal cancer is anterior resection/total mesorectal excision (AR/TME). These are technically demanding operations. Surgeons are traditionally guided by MR (magnetic resonance) images. However, translating MR images into 3D anatomy may be challenging. This can hinder performance of a successful procedure and prolong operative time, both of which can lead to poor patient outcomes. We propose the introduction of pre-operative rehearsals using two types of patient specific 3D anatomical models. Structured Mental rehearsal (SMR) will be used to facilitate the process.

Study design: 33 patients due to undergo AR/TME will be randomly allocated to three groups. According to the allocation, surgeons will undergo the following; group (i) SMR with virtual reality 3D-models, group (ii) SMR with virtual and physical 3D-models (including simulation), and group (iii) SMR with standard MR scans. The primary outcome of this study is surgical performance (Competency Assessment tool) and the secondary is patient outcomes. Pilot data: As "proof of concept" surgical performance after SMR with 3D models and after watching a didactic video was compared. Surgeons who performed SMR using a 3D model performed significantly better (number of movements - 553 vs. 1391.5, $p=0.005$, total path length of instrument tip 1540.24 vs. 2837 $p=0.007$ and time 667s, vs. 1283s, $p=0.003$). Forward plan: Patient specific SMR with the use of 3D models, is expected to increase quality of surgery and specimen and reduce operative complications. The results of this study will create a strong impetus for widespread use of patient-specific SMR.

Take-home message:

Patient specific SMR with the use of 3D models, is expected to increase quality of surgery and specimen and reduce operative complications. The results of this study will create a strong impetus for widespread use of patient-specific SMR.

O87 EVALUATION OF A WEARABLE, WIRELESS DEVICE FOR REMOTE VITAL SIGNS MONITORING IN POST-OPERATIVE PATIENTS

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Introduction: Regular monitoring of post-operative patients helps detect complications earlier and reduce their impact. The National Early Warning Score (NEWS) is the current NHS standard but suffers from inadequate monitoring frequency. SensiumVitals is a wearable, wireless patch that monitors heart rate, respiration rate and temperature every two minutes. It is hypothesised that remote monitoring will allow earlier detection of post-operative complications, prevent admissions to Level II/III care and improve patient outcomes.

Study design: The study is a prospective, non-randomised, parallel-group evaluation of the SensiumVitals monitoring system as an adjunct to NEWS monitoring in patients undergoing resectional colorectal surgery (emergency and elective). Postoperative patients will be allocated to receive SensiumVitals monitoring and NEWS monitoring, or NEWS monitoring alone. The primary outcome measures are number of admissions to Level II/III care and the number of days spent in Level II/III care. The feasibility study will take place between August 2015 and February 2016 and will involve 200 patients in each group. Pilot data Data collection is in the early stages with 30 patients in each group so far. Initial indications suggest that the two groups are similar in terms of age, comorbidity and complications encountered. Preliminary data indicates average complication rates of 18% across all patients. Forward plan Further validation is required. It is hoped that improved patient outcomes will be demonstrated with SensiumVitals monitoring within six months. The feasibility study will inform the design of a randomised, controlled trial.

Take-home message:

A wearable wireless device for near-continuous monitoring of vital signs is being testing in post-operative patients. It is hypothesised to allow earlier detection of patient deterioration when compared to NEWS monitoring alone.

O88 IVANOF: HIGHLIGHTING RECRUITMENT BARRIERS IN RESEARCH

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Introduction: The effect of intravenous iron on postoperative transfusion requirements in hip fracture patients (IVANOF) is a pilot, multicentre, randomised control trial that will examine the effect of intravenous iron on the requirement of blood transfusions and postoperative complications in patients with hip fractures.

Study design: The primary aim is to test whether intravenous iron administration stimulates erythropoiesis, measured by changes in reticulocyte count. The secondary aims include haematological indices, number of transfusions, length of hospital stay, post-operative complications and overall healthcare costs. Eligibility criteria include aged greater than 70, admitted through Emergency Department, femoral neck fracture (excluding undisplaced intracapsular fracture). Clopidogrel use is an exclusion criterion and patients must be able to consent for themselves. Treatment arm receives 3 doses of 200mg IV iron sucrose (at admission, post op day 1 + 2). Control arm receives standard care. We are aiming to recruit 80 patients over 2 sites. Pilot data Despite the large numbers of hip fracture patients in the UK, recruitment has been challenging and we have only recruited 3 patients at our centre. This has led me to look at some of the barriers to recruitment including recruiting cognitively impaired patients, time to theatre and research staff availability. Forward plan (including how it might impact on patients) Our aim is to involve the full multi-disciplinary team to allow us to identify patients earlier and also by the use of research nurses dedicated to this study to ensure that we recruit patients more successfully.

Take-home message:

Recruitment in research can be challenging, especially in patients with cognitive impairment. However with an ageing population we need to find alternative ways to improve recruitment.