IS TELESURGERY A NEW REALITY? OUR EXPERIENCE IN LAPAROSCOPIC AND PERCUTANEOUS PROCEDURES

Micali Salvatore1, Bove Pierluigi1, Steinovic Dana2, Patriucu Alexandru3, Muna Roberto4, Kavoussi Louis Raphael1, Vespucci Giuseppe1

1University of Tor Vergata, Rome, Italy, 2Johns Hopkins University, Baltimore, United States of America

INTRODUCTION & OBJECTIVES: Minimally invasive surgery offers many advantages but his correct practice is associated with a steep learning curve. Telesurgery has been developed to reduce the complications due to inexperienced surgeons. In fact, it allows a surgeon at a remote site to guide and teach practicing surgeons in a primary site by utilizing robotic devices, telecommunications and video technology.

MATERIAL & METHODS: From September 1998 to July 2001, 20 telemedical procedures were telepresented between two separate operating sites 9230 km apart: a primary operating room located at the Policlinico Caulino University of Rome “For Vergata” and a remote site located at the Johns Hopkins Medical Institutions of Baltimore. Of these procedures, 17 were laparoscopic cases: 9 spermatic veins ligation, 2 retroperitoneal renal biopsy, 5 simple nephrectomy and 1 pelviscopy. The other three were percutaneous renal access procedures. All cases were performed with the use of two robots: the first robot for the orientation of the laparoscope (AESOP), and the second one (PAKY), consisting in a passive mechanical arm mounted on the operating table with a radiopaque needle driver, used to perform the percutaneous renal access.

In addition to the robotic system, the provided 4 ISDN lines, a PC with dedicated software for video and audio connection, an external videocamera with a panoramic view of the operating room, and remote control of the electrosurgery and electrorator.

RESULTS: All the procedures were accomplished with an uneventful postoperative course. 15 operative cases were successfully telepresented. In 5 cases, it was not possible to establish a connection to the remote site, and 2 procedures were converted to open surgery because of intraoperative complications. No statistical differences were noted between telementored and non-telemented procedures in terms of operative times, blood loss and postoperative morbidity. Time delay of the image transmission was approximately one second.

CONCLUSIONS: This preliminary experience has demonstrated the feasibility of international telementoring. It is a viable method that could potentially provide education to surgeons and decrease the likelihood of complications due to inexperience with new techniques.

VIHRTUAL URETHROCYSTOSCOPY SIMULATOR WITH HAPTIC FEEDBACK

MINEROLPOULOS D1, DOUNAVIS P1, PAPAGEORGIOS S1, Vlahos R2, Karistinos A1, Kampanyanos P1, Papadopoulos E2

1Department of Urology, Athens Medical School, Athens, Greece, 2Department of Mechanical Engineering, National Technical University of Athens, Athens, Greece

INTRODUCTION & OBJECTIVES: Training in Endourology entails knowing uritary tract anatomy, observing actual procedures and finally, performing them under a specialist’s supervision. However, training in endourology techniques before first patient exposure could offer significant advantages. In order to provide a realistic experience of ureteroscopy, we have developed and continue expanding an interactive virtual reality simulator with force-feedback that also incorporates a surgical tool interface.

MATERIALS & METHODS: The system consists of a personal computer generating the Human-Computer Interface and the three-dimensional (3D) models of the anatomical structures and, the force-feedback device that includes the cystoscope connected to a specialised device. The 3D geometry of the male urethra and the urinary bladder is generated by means of modelling systems using splines to enhance details. A texture library was created for the environmental visualisation. Models are then incorporated in a Graphic Engine (GE) responsible for the realistic representation of the surface using the texture libraries and also for the responsiveness and smooth animation of the models.

The haptic device is connected to a control system simulating the forces generated during insertion of the scope into the urethra and communicating with the GE to transform the graphic display with the instrument’s movement.

RESULTS: The digitised models of the urethra and bladder provide significant similarity to actual endoscopic images. The force-feedback device conveys to the user realistically the interactive forces, while it is very well synchronised with the corresponding real-time digitised images.

CONCLUSIONS: Although it is unlikely that all the details found in real surgery can be captured by simulators, our device may capture enough of the real experience to provide useful training in endourology.

Source of funding: GSRT research grant No 99ED64.

HTERT AND DD3/PCA3 GENE EXPRESSION IN PROSTATIC TISSUES: DIFFERENTIATION BETWEEN NORMAL PROSTATE, BENIGN PROSTATE HYPERPLASIA AND PROSTATE TUMOURS

de Kok Jacques1, Verheugt Gerald1, Roonlofs Rian1, Hessels Daphne1, Kiemeyer Bart1, Aaldering Tilly1, Swinkels Dorine1, Schalken Jack1

1Clinical Chemistry, UMC Nijmegen, Nijmegen, The Netherlands, 2Experimental Urology, UMC Nijmegen, Nijmegen, The Netherlands, 3Medical Statistics, UMC Nijmegen, Nijmegen, The Netherlands

INTRODUCTION & OBJECTIVES: We recently identified DD3/PCA3 as one of the most prostate cancer-specific genes. This makes DD3/PCA3 an interesting candidate for use as a diagnostic and/or prognostic marker. The diagnostic and prognostic value of DD3/PCA3 was determined and compared with another promising tumour marker, telomerase reverse transcriptase (hTERT), which expression is directly related to telomerase activity.

MATERIAL & METHODS: In this study we developed a method for the accurate quantification of DD3/PCA3 using real-time quantitative RT-PCR and confirmed that DD3/PCA3 was expressed in the prostate but not in 21 selected other tissues or blood.

RESULTS: Sensitivity and specificity estimates of both genes were calculated as the area under the receiver operation curve characteristics (AUC ROC) and were 0.978 for DD3/PCA3 and 0.894 for hTERT, both demonstrating excellent power of discrimination between malignant and non-malignant prostate tissues. The mean increase of gene expression in tumour tissues compared to healthy and BPH tissues was 54-fold for DD3/PCA3 and 11-fold for hTERT. In malignant cells, the mean copy number of DD3/PCA3 mRNA was 460-fold higher than hTERT. No relationship was observed between prognostic parameters and DD3/PCA3 or hTERT gene expression.

CONCLUSIONS: This results indicate that DD3/PCA3 can be a sensitive marker for the detection of disseminated malignant prostate cells in body fluids, or small numbers of tumour cells in prostate needle biopsies.

Source of funding: The project is funded by the European Commission, Contract No. QLRT-1999-01144.

BTHERMODYNAMICS OF LAPAROSCOPIC VENTILATION - ROLE OF THE OPERATING ROOM ENVIRONMENT

BARTLETT JF1,2, LINDSAY D3, TAYLOR R1,4, PERRY SE1, MEYER WA1,2, BEMBINI M1

1Departments of Anaesthesia and Urology, University College Hospital, London, 2Department of Basic Medical Sciences, Imperial College, London, 3Department of Internal Medicine, University College Hospital, London, 4Department of Urology, University College Hospital, London

INTRODUCTION & OBJECTIVES: Laparoscopy is commonly performed for diagnostic purposes and for therapeutic procedures. The effects on the operating environment of laparoscopic surgery have not been fully investigated. The impact of the operating environment on the temperature and humidity of the operating room during laparoscopic surgery are assessed in this study.

METHODS: The study was approved by the local Research Ethics Committee. All patients aged 18-70 years, scheduled for elective laparoscopic surgery were included. Laparoscopic data were recorded prospectively. The operating room environment was monitored using thermistors and hygrometers placed at the operator’s head level.

RESULTS: The results showed that the operating environment was significantly affected by the laparoscopic procedure. The temperature and humidity of the operating room increased significantly during the procedure, with the highest values occurring during the trocar insertion and the inflation of the pneumoperitoneum. The temperature and humidity values returned to the preoperative levels within 10 minutes after the termination of the procedure.

CONCLUSIONS: The results suggest that laparoscopic surgery significantly affects the operating environment, with potential implications for the comfort and safety of the surgical team. Further research is needed to fully understand the impact of laparoscopic surgery on the operating environment and to develop strategies to mitigate these effects.