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

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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 practising surgeons in a primary site by utilising robotic devices, telecommunications and video technology.

MATERIAL & METHODS: From September 1998 to July 2001, 20 telesurgical procedures were telementored between two separate operating sites 9230 km apart: a primary operating room located at the Policlinico Casilino University of Rome "Tor 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 pieloplasty. 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 radiolucent needle driver, used to perform the percutaneous renal access. In addition to the robotic device, the system provided 4 ISDN lines, a PC with dedicated software to manage the connection, audio and video connection, an external videocamera with a panoramic view of the operating room, and remote control of the electrocautery and telestrator.

RESULTS: All the procedures were accomplished with an uneventful postoperative course. 12 operative cases were successfully telementored. In 6 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-telementored groups 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.

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VIRTUAL URETHROCYSTOSCOPY SIMULATOR WITH HAPTIC FEEDBACK

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INTRODUCTION & OBJECTIVES: Training in Endourology entails knowing urinary 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 ureterocystoscopy, 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 synchronise 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.

P1 PROSTATE CANCER: GENETICS AND GENE THERAPY
Sunday, February 24, 11.45-13.15 hrs, Room G

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A SINGLE NUCLEOTIDE POLYMORPHISM IN THE E-CADHERIN GENE PROMOTER MODIFIES THE RISK OF PROSTATE CANCER

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INTRODUCTION & OBJECTIVES: E-cadherin plays a major role in intercellular adhesion, cell polarity, and tissue architecture. A previous study found a C/A single nucleotide polymorphism (SNP) at -160 bp relative to the transcriptional start site of the E-cadherin promoter. The A-allele of this polymorphism decreased the transcriptional efficiency by 68% compared to the C allele in a humane prostate cancer cell line. In this study we hypothesised that the A-allele increases the risk of prostate cancer (PCa).

MATERIAL & METHODS: In total, 82 prostate specimens from PCa patients and 188 controls were analysed. Genomic DNA from all subjects was obtained and genotyped for the C/A SNP using PCR methods.

RESULTS: Among the subgroups of controls no differences were observed regarding genotype or A-allele frequency. For PCa cases frequencies for the AA, AC, and CC genotypes were 0.04, 0.70, and 0.26, respectively. In controls these frequencies were 0.05, 0.40, and 0.55, and differed significantly from cases. The A-allele was more frequent among cases compared to controls (0.39 vs. 0.25). Compared to C-only carriers, A-allele carriers had a higher risk of PCa (OR=3.6; 95% CI: 2.0-6.4). AC and AA genotypes have an increased risk of prostate cancer (OR=3.8; 95% CI: 2.1-6.8, and OR=1.7; 95% CI: 0.4-6.6, respectively) compared to CC genotypes. Subgroup analyses showed that these associations were present among sporadic PCa cases, but not among hereditary PCa cases.

CONCLUSIONS: We conclude that the A-allele in the C/A SNP modifies the risk of PCa.

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

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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.