Robotic assisted partial nephrectomy and mixed reality - first surgical planning experience with brainlab elements and magic leap 1

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Introduction & Objectives: Since the creation of the first aeronautical sensory simulators in 1960, new applications for Virtual Reality (VR) and Augmented Reality (AR) have been taking place. In minimally invasive surgery, VR and AR have been used both in surgical training and in operative planning. We aim to describe the first case of Robotic Assisted Partial Nephrectomy (RAPN) with surgical planning in mixed reality based on Brainlab software and use of the Magic Leap eyeglass device.

Materials & Methods: Brainlab Elements surgical planning software (Brainlab AG, Munich, Germany) with planning for VR was used. A three-dimensional image was conceived using 0.5mm slices in abdominal angiotomography. Illustrated both the parenchyma and renal tumor and the vascular tree and collecting system of the tumor kidney. In order to visualize it in the context of augmented 3D reality, the Magic Leap 1 device (Magic Leap Inc., Plantation, FL, USA) was used. Image was used in the context of operative planning of a 42-year-old female patient with a right endophytic renal tumor measuring approximately 3.7 x 3.6 x 3.5 cm. RENAL score was 11x, PADUA score was 12 and serum creatinine was 0.9mg/dl.

Results: Patient underwent right RAPN with Brainlab Elements software planning and mixed reality using Magic Leap glasses. During surgery, laparoscopic ultrasound was used. Operative time was 160 min, warm ischemia time was 32min, EBL was 150ml. Patient was discharged on POD3, with a GFR of 88mL/min/1.73m² and serum creatinine 0.9mg/dl. The pathological report revealed oncocytoma. One month after surgery, patient’s serum creatinine was 0.85 mg/dl.

Conclusions: Incorporating new technology has been helpful for better surgical outcomes in various minimally invasive procedures. The use of mixed reality from Brainlab and Magic Leap is feasible and can potentially help during perioperative planning of robotic partial nephrectomy.