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Mixed Reality on Robotic Assisted Partial Nephrectomy

In the treatment of renal tumors, new technologies for surgical precision have been developed since 1960. This technological expansion occurred with the entry of aeronautical simulator technology into the field of medicine. Thus, new applications for Virtual Reality (VR) and Augmented Reality (AR) have been adopted in the operating room. In urology, VR and AR have been used both in surgical training and in operative planning for renal tumors.

In this way, there are many software that help us plan the surgery, and in some cases, we can also make use of devices that combine realities in order to work surgically with mixed reality; that is, virtual reality superimposed on surgical reality.

For Robotic Partial Nephrectomy (RAPN) cases in our group, Brainlab Elements surgical planning software (Brainlab AG, Munich, Germany) with planning for VR were used. A specific protocol for abdominal computed tomography angiography was developed, with the acquisition of a three-dimensional image, from 0.5mm slices, illustrating with precision both the parenchyma and renal tumor and the vascular tree and collecting system of the kidney tumor.
In order to visualize it in the context of augmented 3D reality, the Magic Leap 1 device (Magic Leap Inc., Plantation, FL, USA) was also used, overlapping the realities.

In a series of 15 cases with different RENAL and PADUA scores for renal tumors, patients underwent RAPN with Brainlab Elements software planning and mixed reality using Magic Leap glasses. The number of intracorporeal ultrasound use decreased with the use of mixed reality and patients had good oncological and functional outcomes.

Adding new technologies has been helpful for better surgical outcomes in various minimally invasive procedures in urology. The use of mixed reality from Brainlab and Magic Leap is feasible and can potentially help during perioperative planning of robotic partial nephrectomy for the treatment of renal tumors