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Practical application of augmented/mixed in surgery of abdominal cancer patients

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Advanced abdominal and pelvic cancer remains a complex oncological problem. Recurrence rate is high. The key to successful and safe surgical procedures (SP) is careful planning and intraoperative navigation (ION), including augmented/mixed reality (AR/MR). Medical use of AR/MR changed from a training tool [2–5], to the instrument that is used before and during SP. The benefit provided AR/MR at preoperative planning and ION is extremely in demand for SP of cancer patients. Study of results of AR/MR applying is relevant.

Methodology & Theoretical Orientation: Clinical part consists 8 patients. Seven suffered from recurrent malignancies in the abdomen and pelvis. The technical part includes AR/MR hardware/software complex: PC, Microsoft Hololens-2 glasses, positioning markers (PM) and software set: 3D-Slicer for DICOM data analysis and segmentation, two custom software. The first one served for creating 3D-models with PM and uploading 3D-models to the glasses. The second alloved to superimpose the 3D-model and patient [13].

Findings: Using AR/MR we performed SP (7 cases). One patient not operated due cancer generalization. We used invasive bone pin PM (3 times), non-invasive skin magnetic PM (4) (Fig 2.) SPs' durations were 90-390 minutes. All SPs achieved their goals. No major complications encountered. The most demonstrative patient had cancer invasion to the sacrum and coccyx (Fig. 3). He needed two PMs (Fig 2a) according abdominal stage (Fig 4a) and sacral resection stage (Fig 4b). For operated patients AR/VR allowed to verify the radicalism of SPs, to improve ION close the zone-of-interest, to reduce SPs' duration, thereby reducing the complication rate and improving the rehabilitation period. We plan to discuss a range of difficulties we encountered and resolving measures later.

Conclusion & Significance: We considered the use of AR/MR as a perspective method of preoperative planning and ION in abdominal cancer patients.

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