

# Virtual Reality Exploration and Planning for Precision Colorectal Surgery.

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### Abstract

**BACKGROUND:** Medical software can build a digital clone of the patient with 3-dimensional reconstruction of Digital Imaging and Communication in Medicine images. The virtual clone can be manipulated (rotations, zooms, etc), and the various organs can be selectively displayed or hidden to facilitate a virtual reality preoperative surgical exploration and planning.

**OBJECTIVE:** We present preliminary cases showing the potential interest of virtual reality in colorectal surgery for both cases of diverticular disease and colonic neoplasms.

**DESIGN:** This was a single-center feasibility study.

**SETTINGS:** The study was conducted at a tertiary care institution.

**PATIENTS:** Two patients underwent a laparoscopic left hemicolectomy for diverticular disease, and 1 patient underwent a laparoscopic right hemicolectomy for cancer. The 3-dimensional virtual models were obtained from preoperative CT scans. The virtual model was used to perform preoperative exploration and planning. Intraoperatively, one of the surgeons was manipulating the virtual reality model, using the touch screen of a tablet, which was interactively displayed to the surgical team.

**MAIN OUTCOME MEASURES:** The main outcome was evaluation of the precision of virtual reality in colorectal surgery planning and exploration.

**RESULTS:** In 1 patient undergoing laparoscopic left hemicolectomy, an abnormal origin of the left colic artery beginning as an extremely short common trunk from the inferior mesenteric artery was clearly seen in the virtual reality model. This finding was missed by the radiologist on CT scan. The precise identification of this vascular variant granted a safe and adequate surgery. In the remaining cases, the virtual reality model helped to precisely estimate the vascular anatomy, providing key landmarks for a safer dissection.

**LIMITATIONS:** A larger sample size would be necessary to definitively assess the efficacy of virtual reality in colorectal surgery.

**CONCLUSIONS:** Virtual reality can provide an enhanced understanding of crucial anatomical details, both preoperatively and intraoperatively, which could contribute to improve safety in colorectal surgery.

PMID: 29722730 DOI: [10.1097/DCR.0000000000001077](#)

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