Use of augmented reality in Gynecologic surgery to visualize adenomyomomas

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Introduction: Augmented Reality (AR) is a surgical guidance technology that enables important hidden surface structures to be visualized in endoscopic images. We have developed a new AR approach specifically for uterine surgery and demonstrated its use for myomectomy. We here report its use for laparoscopic adenomyomas localization, in two cases, using video, approved the local Institutional Review Board.

Patients and methods: First case: a 28-year-old patient with dysmenorrhea and recurrent miscarriage underwent an MRI that shown an adenomyoma, and endometriosis lesion of the utero-sacral ligament. We performed a laparoscopic surgery.
Second case: A 39-year-old woman with dyspareunia and dysmenorrhea due to endometriosis lesions of the utero-sacral ligament and deep adenomyomas underwent a laparoscopic surgery.

Results: AR was used during laparoscopy to localize the adenomyomas. Three-dimensional (3D) models of the patients’ uterus, uterine cavity and adenomyoma were constructed before surgery from T2-weighted magnetic resonance imaging. The intraoperative 3D shape of the uterus was determined. These models were automatically aligned and “fused” with the laparoscopic video in real time. The live fused video made the uterus appear semitransparent, and the surgeon can see the location of the adenomyoma and the uterine cavity in real time. With this information, the surgeon can easily and quickly decide on how best to access the adenomyoma.

Conclusion: we developed an AR system for gynecologic surgery and have used it to improve laparoscopic myomectomy. This system can also improve laparoscopic adenomyomectomies, improve safety and reduce time in the operating room.

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Keywords : Augmented reality, Gynecologic surgery, laparoscopy, adenomyomectomy, MRI
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