First use of Augmented Reality in Gynecology

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**Objective:** To report the first use of Augmented Reality (AR) in gynecology.

Design: AR is a surgical guidance technology that enables important hidden surface structures to be visualized in endoscopic images. AR has been used for other organs, but never in gynecology and never with a very mobile organ like the uterus. We have developed a new AR approach specifically for uterine surgery and demonstrate its use for myomectomy.

Setting: Tertiary University Hospital.

Patients: A 38 year old woman with a 6 cm uterine myoma.

Interventions: A laparoscopic myomectomy was performed with the use of AR.

Measurements and main results: Pre-operatively, three-dimensional (3D) models of the patient's uterus and myoma were constructed prior to surgery from a T2 MRI.
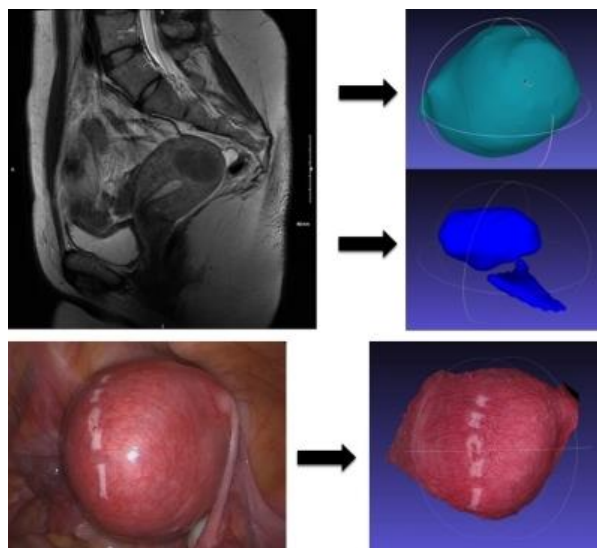
The intra-operative 3D shape of the uterus was determined. These models were automatically aligned and "fused" with the laparoscopic video in real-time (Figure 2). The live, fused video made the uterus appear semi-transparent and the surgeon can see the location of the myoma in real-time while moving the laparoscope and the uterus. With this information the surgeon easily and quickly decides on how best to access the myoma.

Conclusions: To improve laparoscopic myomectomy, we have developed an AR system for gynecological surgery. Technically, our software is very different to approaches tried for other organs, and can handle significant challenges including image blur, fast motion and partial views of the organ. It is the first to successfully perform AR with a moving organ such as the uterus.