DEVELOPMENT OF A SIMULATION-BASED LAPAROSCOPIC VENTRAL RECTOPEXY MODULE: DESIGN AND CONSTRUCT VALIDITY

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Background

Laparoscopic Ventral Mesh Rectopexy (LVMR) provides a safe surgical solution with favorable functional outcomes for rectal prolapse. However, it remains less common than other colorectal surgeries. This, combined with the complexity of pelvic anatomy, makes the LVMR challenging even for surgeons proficient in minimally invasive techniques. Developing a specific training that addresses this procedure could better prepare surgeons prior to clinical exposure. We aim to present the development and validation of a simulated LVMR training model.

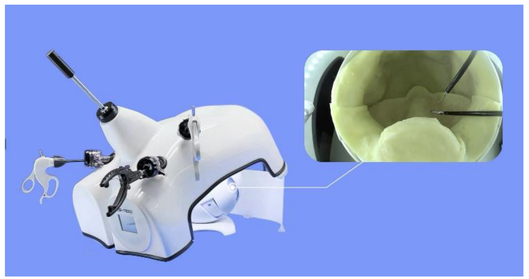
Methods

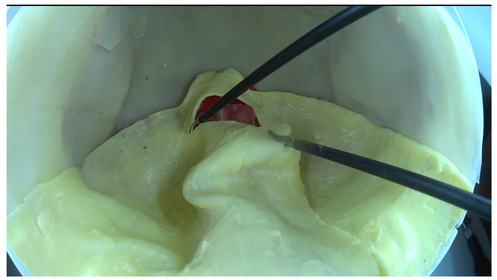
This educational study tested a simulation-based scenario for LVMR. Continuous iterations were performed to develop a functional prototype. Bone structure was 3D-printed based on real measurements, and soft tissues were created using molded platinum silicone. Once a functional prototype was achieved, surgeons with varying levels of expertise performed LVMR on the model, which was installed in an endotrainer. Participants were surveyed to register their surgical experience and opinions on the simulator's fidelity and educational value. Performance was evaluated by two independent, blinded surgeons using procedural time, a modified Objective Structured Assessment of Technical Skills (OSATS),and a Procedure-Specific Rating Scale (SRS), focusing on key steps: peritoneal flap dissection, mesh fixation, and flap closure. A descriptive and non-parametric statistical approach analyzed how surgical experience influenced performance.

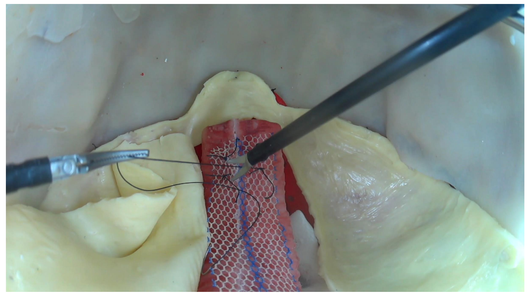
Results

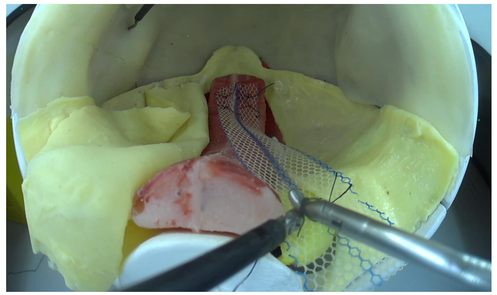
A pelvic simulator for LVMR was successfully developed and evaluated by 3 coloproctologists (30%), 3 coloproctology residents (30%), and 4 general surgeons (40%). All participants had formal training in intracorporeal suturing and reported over 200 laparoscopic procedures.

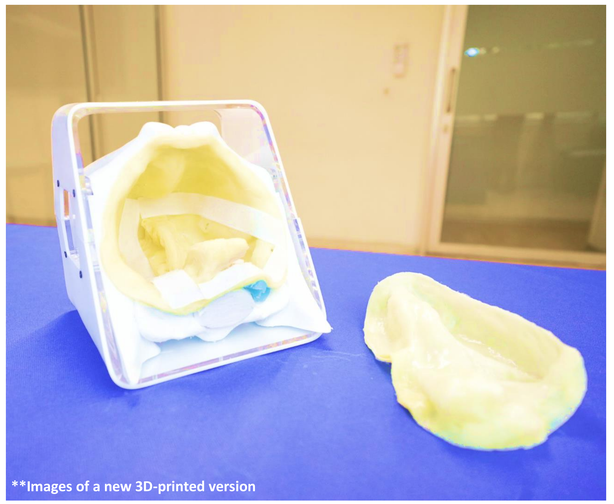
Results











Surgeons who had performed at least two LVMR procedures as the primary surgeon performed better compared to those with less LVMR experience:

Median OSATS 20.5 vs. 16 (p=0.01)

Median SRS 16.25 vs. 13.5 (p=0.009)

Median of 29.3 vs. 52.8 minutes (p=0.07)

Regarding all participants, median OSATS score was 18 [IQR 4.75] and the median SRS score was 15 [IQR 2.5] and all reported that the module enabled them to understand and reflect on the proposed surgical technique, with a global evaluation of the activity receiving a score of 5 out of 5.

Conclusion

These results support the construct validity of this LVMR simulation model, with clinical experience influencing performance. Further studies will explore how training on this model could possibly enhance the LVMR surgical learning curve.

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