From Bench to Body: Advancing Laparoscopic Training from In Vitro Models to Cadaveric Simulations in General Surgery

Evelyn Dorado A. MD FACS FASMBS . Javeriana University Cali Colombia

Introduction

In the field of laparoscopic surgery training, there is an ongoing debate about the effectiveness of different training models, including in vitro (bench) models, animal models, live surgery by experts, and cadaveric models. I have used all available models and drawn conclusions about their effectiveness in laparoscopic learning.

Metods and Procedures

Since 2012, I have conducted 10 courses on the fundamentals of laparoscopy, 18 courses on laparoscopic inguinal hernia repair, and 4 courses on advanced abdominal wall reconstruction. In all courses, I use a hybrid model with both recorded and real-time lectures. Over time, we have transitioned from in vitro models (silicone and mixed), live surgery, surgery with animal models, and cadaveric surgery models.

Results

Based on the students' experiences with all types of models, an evaluation was conducted to determine which learning model was most useful. The evaluation included 278 students distributed as follows: 30% (84) in the fundamentals of laparoscopy course, 28.7% (80) in the abdominal wall reconstruction course, and 41% (114) in the laparoscopic inguinal hernia repair course.





100% of the participants used in vitro models.
5.7% (16) used both in vitro and animal models.
29% (82) used both in vitro models and live surgery.
44% (123) used cadaveric models along with in vitro models and live surgery.
Additionally, 3 practices were conducted using fluorescence in cadaveric models.
The satisfaction evaluation of the models used revealed the following:
100% of students found the in vitro model very useful for spatial orientation and technique management.
Those who observed live surgery indicated that, while useful, they wished to participate in the procedure.
Students who used animal models indicated that the dissimilar anatomy made it less useful as a learning model.
The frozen cadaveric model combined with the in vitro model was rated as the most successful teaching model, with all participants rating it as excellent.

Conclusion

In teaching, it is essential to adapt to innovations and available models to provide a comprehensive experience for the student. We understand the benefits of in vitro models, which are cost-effective for the student's initial approach without ethical concerns. Animal models offer a more realistic scenario but come with ethical issues and anatomical dissimilarities. The cadaveric model provides anatomical certainty, no ethical issues, and real procedures, making the combination of all three models ideal for the learning process.