ELSEVIER

JMIG The Journal of Minimally Invasive Gynecology

Original Article

Modular Comparison of Laparoscopic and Robotic Simulation Platforms in Residency Training: A Randomized Trial

Mostafa A. Borahay, MD, Mary C. Haver, MD, Benjamin Eastham, MD, Pooja R. Patel, MD, and Gokhan S. Kilic, MD*

From the Department of Obstetrics and Gynecology, The University of Texas Medical Branch at Galveston (all authors).

ABSTRACT **Study Objective:** To compare minimally invasive surgery (MIS) skills acquired using laparoscopic and robotic simulation training platforms.

Design: Randomized trial (Canadian Task Force classification I).

Setting: University residency training program.

Subjects: PGY1 and PGY2 resident physicians in Obstetrics and Gynecology.

Interventions: All residents completed prestudy questionnaires (demographic data and previous experience in MIS) followed by simulation pretesting to assess baseline laparoscopic and robotic skills. Residents were then randomized to laparoscopic or robotic training cohorts in which they completed proctored training of 4 basic laparoscopic or 4 matching robotic modules (1 hour per module, 4 hours total). Thereafter, residents repeated the timed assessment of all skills. Finally, they completed poststudy questionnaires about the training experience. The primary outcome measure was the percentage of improvement in skill completion time. Secondary outcome measures were answers to poststudy questionnaires.

Measurements and Main Results: Sixteen residents completed the study. The laparoscopic and robotic training groups did not differ substantially on demographic measures, previous experience in MIS, or baseline laparoscopic and robotic completion times. Median improvement for individual laparoscopic modules was, respectively, 37.76%, 46.43%, 53.29%, and 66.48% in the laparoscopic cohort vs 21.84%, 21.80%, 38.15%, and 32.98% in the robotic cohort. Median improvement for individual robotic modules was, respectively, 35.42%, 26.08%, 22.33%, and 47.48% in the laparoscopic cohort vs 52.70%, 62.02%, 67.64%, and 71.62% in the robotic cohort. Median improvement in combined laparoscopic, robotic, and overall skills was, respectively, 50.56%, 34.83%, and 45.52% in the laparoscopic group vs 36.18%, 64.12%, and 49.86% in the robotic group. Residents predicted greater comfort performing surgical procedures using the platform in which they trained; however, the robotic training cohort liked their training more.

Conclusions: Laparoscopic and robotic simulation platforms each demonstrated improved performance in the same and other platform. The robotic platform seems to have an edge over the laparoscopic platform. Larger studies are required in addition to studies to compare the effectiveness of both platforms in more advanced skills and to compare their effect on proficiency in the operating room. Journal of Minimally Invasive Gynecology (2013) 20, 871–879 © 2013 AAGL. All rights reserved.

Keywords: Laparoscopic; Residency; Robotic; Simulation; Training

DISCUSS You can discuss this article with its authors and with other AAGL members at **http://www.AAGL.org/jmig-21-1-JMIG-D-13-00276R1**

Use your Smartphone to scan this QR code and connect to the discussion forum for this article now*

* Download a free QR Code scanner by searching for "QR scanner" in your smartphone's app store or app marketplace.

Supported by an Educational Technology Grant from the Academy of Master Teachers (M.A.B) and by funding from the Department of Obstetrics and Gynecology, The University of Texas Medical Branch.

The authors declare that they have no financial conflicts of interest.

Corresponding author: Gokhan S. Kilic, MD, Department of Obstetrics and Gynecology, The University of Texas Medical Branch, 301 University Blvd, Galveston, TX 77555-0587.

E-mail: gokilic@utmb.edu

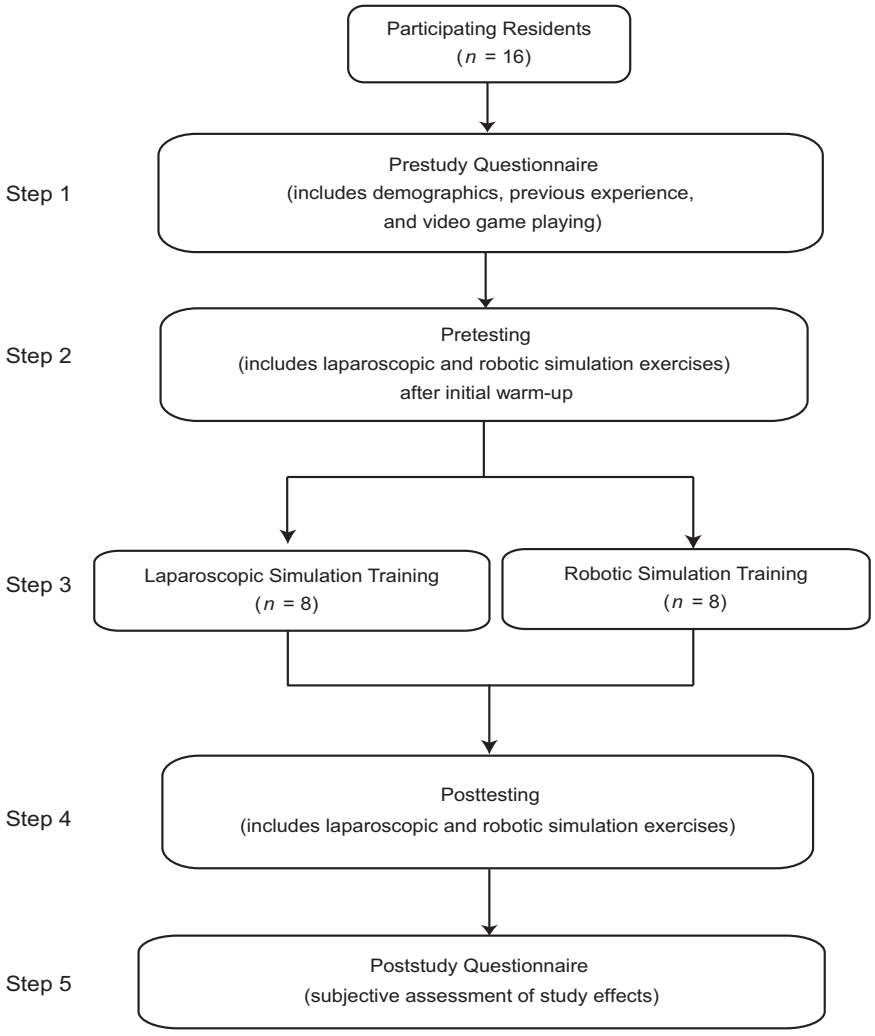
Submitted May 9, 2013. Accepted for publication June 14, 2013.

Available at www.sciencedirect.com and www.jmig.org

http://dx.doi.org/10.1016/j.jmig.2013.06.005

Fig. 1

Study flowchart.



During the past few decades, laparoscopic techniques have continued to gain popularity and for certain procedures have become the standard of care. This popularity is attributed to a multitude of advantages including less blood loss, faster recovery, less pain, and better cosmetic outcome. Since their approval by the US Food and Drug Administration in 2000, robot-assisted procedures are rapidly becoming an integral part of clinical practice in the United States and many other parts of the world. Indeed, at some institutions, laparoscopic and robot-assisted approaches, collectively known as minimally invasive surgery (MIS), are being performed more frequently than conventional (open) approaches [1].

In view of these trends, training residents to be proficient in MIS skills has become a priority. Ideally, residents should have expertise in at least the basic skills before performing procedures on patients. This is even more critical in the current environment of decreasing surgical volumes accessible to residency programs, increased litigation, and continuous efforts to reduce operating room time to cut costs. For all of these reasons, laparoscopic simulators were introduced and have been demonstrated to improve patient safety and operating room efficiency [2–4]. For the same reasons, the more recent introduction of the da Vinci robotic surgical system was followed by launching of multiple robotic surgical simulators. Face, content, and construct validity of these robotic simulators have been evaluated [5].

Thus, residency programs in Obstetrics and Gynecology, as well as other specialties, have developed laparoscopic and robotic simulation curricula as components of residency training [6–8]. Given the high costs of these simulators (e.g., robotic simulators cost in the range of $100 000 in addition to maintenance costs), it is not clear