Improving Residents' Comfort with Salpingectomy at Cesarean Delivery Through Surgical Simulation

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ABSTRACT

INTRODUCTION: To study obstetric and gynecologic (OBGYN) resident comfort with performing a salpingectomy at cesarean delivery after a simulation workshop utilizing a low-cost, easy-to-construct model.

METHODS: OBGYN residents were taught how to counsel a patient on a salpingectomy and perform the steps of the procedure utilizing our simulation model. We performed a pre- and post- survey.

RESULTS: Thirty-two OBGYN residents completed the pre-questionnaire (response rate 100%) and 30 completed the post-questionnaire (response rate 94%). After the simulation, OBGYN residents felt more comfortable completing a bilateral salpingectomy at cesarean delivery (pre: 50.0% vs. post: 84.4%, p=0.001) and counseling a patient on the procedure (pre: 59.4% vs. post: 90.6%, p=0.006). After the simulation, 96.7% of residents felt the simulation workshop was useful to clinical practice.

CONCLUSION: We developed an easy-to-construct bilateral salpingectomy at cesarean delivery model to practice preoperative counseling and surgical techniques. The direct impact on surgical competency and outcomes requires further study.

KEYWORDS: medical education; simulation; prophylactic salpingectomy; resident training; risk reduction

INTRODUCTION

Molecular data suggest that a significant portion of serous ovarian cancers originate from the fallopian tubes rather than the ovary.[1-3] Bilateral salpingectomy, or removal of the entire fallopian tubes, can decrease a person's lifetime risk of ovarian cancer by a third when compared to tubal ligation, or removing just a middle segment of tube.[4-6] Due to this potential risk reduction, opportunistic bilateral salpingectomy has been rapidly adopted at both the time of hysterectomy and interval sterilization; however, this trend has not yet been seen at time of cesarean delivery.[7,8] Recent literature has demonstrated the procedure's safety and feasibility.[9-13] The limited published data on perceived barriers to offering salpingectomy at cesarean delivery include concern for increased surgical complications and a lack of equipment.[14-16] Surgical simulation using low-fidelity models has previously been shown to be beneficial in developing technical skills and improving provider comfort with abdominal surgery.[17,18]

We developed an easy-to-construct, low-cost simulation model for obstetric and gynecologic (OBGYN) residents to practice a bilateral salpingectomy at cesarean delivery using suture ligation. Our objective was to assess OBGYN resident comfort with performing a salpingectomy at cesarean delivery after a simulation workshop utilizing the model. Our secondary objective was to assess OBGYN resident comfort with counseling a patient on a salpingectomy at cesarean delivery.

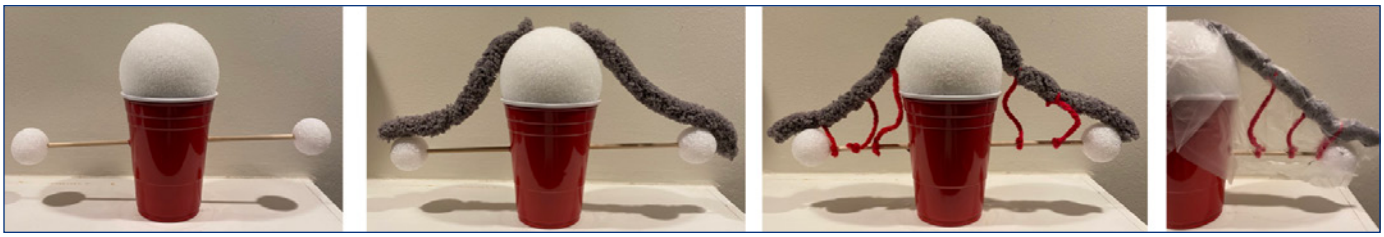
METHODS

We performed a pre- and post-survey study of OBGYN resident physicians before and after completion of a bilateral salpingectomy at cesarean delivery simulation workshop. The workshop was designed for all training years of OBGYN residency. The model was developed to simulate performance of a bilateral salpingectomy using suture ligation, to focus on mastery of foundational surgical skills and ensure comfort in lower resource settings [**Figure 1**].

The paper questionnaire comprised of 5–7 questions on resident experience and comfort with salpingectomy at cesarean delivery. The simulation workshop began with a 15-minute presentation on patient counseling and a stepwise visual depiction of the procedure. Hands-on practice of the steps of a salpingectomy using suture ligation was performed on the models [**Figure 1**]. Supplies for the models can be purchased from a local crafts store. Building eight models can cost less than $100 and be constructed in less than two hours [**Figure 1**].

Ethical approval to perform and report this study was approved by the Care New England Women & Infants Institutional Review Board (#1437846). Statistical analysis included Fischer's exact test to assess baseline categorical data and McNemar's test to assess pre-post differences in comfort counseling about and performing salpingectomy at cesarean delivery.

Figure 1. The low-cost simulation model was constructed through the following steps using materials purchased from a local crafts store.



RESULTS

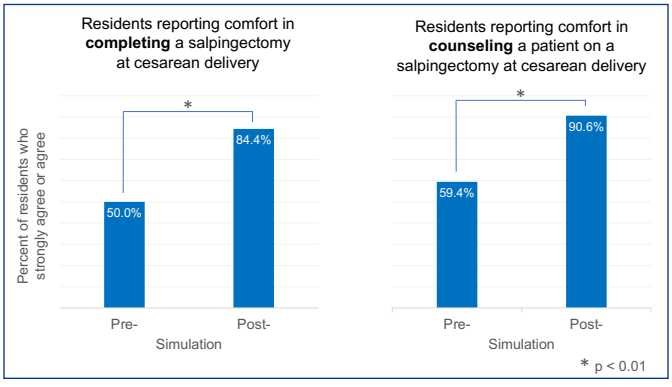
A total of 32 OBGYN residents participated in the simulation workshop. Twenty residents (PGY1-4) participated in the session on October 9th, 2020 and 12 residents (PGY1-2) participated on September 1st, 2022. No resident completed the simulation workshop twice. All 32 residents completed the pre-questionnaire (response rate 100%). Thirty residents completed the post-questionnaire (response rate 94%) as two residents inadvertently completed the pre-simulation survey twice. The pre-questionnaire was completed by 11 PGY-1, 12 PGY-2, 6 PGY-3, and 3 PGY-4 residents.

In the pre-simulation survey, 21 (66%) of residents reported ever having completed a salpingectomy at time of cesarean delivery. They reported experience utilizing suture ligation (86%) and bipolar sealing electrocautery (95%) at similar rates, but more residents reported preferring bipolar sealing electrocautery (80%) over suture ligation (20%).

After the simulation workshop, more residents "strongly agreed" or "agreed" that they felt comfortable completing a salpingectomy at cesarean delivery (pre: 50.0% vs. post: 84.4%, p=0.001) [**Figure 2**]. Similarly, more residents "strongly agreed" or "agreed" that they felt more comfortable counseling a patient on a salpingectomy at cesarean delivery (pre: 59.4% vs. post: 90.6%, p=0.006) [**Figure 2**].

Of the 30 completed post-simulation questionnaires, 29 (96.7%) residents responded that they "strongly agreed" or "agreed" that the simulation was clinically useful. One resident skipped the question.

Figure 2. Obstetric and gynecologic residents reported increased comfort in performing and counseling a patient on a salpingectomy at cesarean delivery after a hands-on simulation workshop.



DISCUSSION

We developed a low-cost, easy-to-construct model to simulate a bilateral salpingectomy at time of cesarean delivery and provide hands on practice for OBGYN residents. Despite the low-fidelity design of the model, residents were able to successfully practice fundamental surgical skills – both tactile and communication-based – that are necessary for performing the procedure. After participating in the simulation workshop, OBGYN residents reported significantly improved comfort with performing the procedure. Furthermore, OBGYN residents felt more comfortable counseling their patients on the option of salpingectomy at cesarean delivery.

A limitation in our analysis is the utilization of resident comfort as a surrogate for comfort with performing the actual surgery. The direct impact on surgical efficiency and outcomes requires further study. Additional evaluation of resident's surgical efficacy or surgical outcomes could further validate the impact of the model. While this workshop has only been implemented thus far at a single institution, we are hopeful it can be replicated at other OBGYN training programs. Future evaluation of the model could investigate its impact on competence with the procedure. Given the low cost and ease with construction of the model, the simulation has the potential to be utilized at regular intervals for trainees to maintain skill proficiency with this important procedure.[19] The supplies are easily to locate at a local craft shop and each item can be easily be substituted if needed. The workshop does require a facilitator who is comfortable with performing the procedure and teaching others the steps.

During implementation of the workshop, we valued the importance of rotating through smaller groups of residents. A higher instructor-to-resident ratio allowed for more direct observation and immediate feedback when residents were practicing on the models. Alternatively, having two or more leaders for the workshop could facilitate this higher instructor-to-resident ratio.

CONCLUSION

Surgical simulation can improve physician skills and comfort with OBGYN procedures. This simulation workshop can be easily replicated at other institutions to increase physician comfort with, and subsequent utilization of, bilateral

salpingectomy at cesarean delivery. Future research should evaluate the impact of this intervention on surgical competency and efficiency. Increasing the performance of opportunistic salpingectomy can potentially reduce rates of future ovarian cancer diagnoses.

References

1. Crum CP. Intercepting pelvic cancer in the distal fallopian tube: Theories and realities. *Mol Oncol*. 2009;3(2):165. doi:10.1016/J.MOLONC.2009.01.004
2. Kurman RJ, Shih IM. The Dualistic Model of Ovarian Carcinogenesis: Revisited, Revised, and Expanded. *Am J Pathol*. 2016;186(4):733-747. doi:10.1016/J.AJPATH.2015.11.011
3. Erickson BK, Conner MG, Landen CN. The role of the fallopian tube in the origin of ovarian cancer. *Am J Obstet Gynecol*. 2013;209(5):409-414. doi:10.1016/J.AJOG.2013.04.019
4. Lessard-Anderson CR, Handlogten KS, Molitor RJ, et al. Effect of tubal sterilization technique on risk of serous epithelial ovarian and primary peritoneal carcinoma. In: *Gynecologic Oncology*. 2014. doi:10.1016/j.ygyno.2014.10.005
5. Hanley GE, McAlpine JN, Kwon JS, Mitchell G. Opportunistic salpingectomy for ovarian cancer prevention. *Gynecol Oncol Res Pract*. 2015;2(1). doi:10.1186/S40661-015-0014-1
6. Venkatesh KK, Clark LH, Stamilio DM. Cost-effectiveness of opportunistic salpingectomy vs tubal ligation at the time of cesarean delivery. *Am J Obstet Gynecol*. 2019;220(1):106.e1-106.e10. doi:10.1016/J.AJOG.2018.08.032
7. Jones NL, Schulkin J, Urban RR, et al. Physicians' Perspectives and Practice Patterns Toward Opportunistic Salpingectomy in High- and Low-Risk Women. *Cancer Invest*. 2017;35(1):51-61. doi:10.1080/07357907.2016.1242597
8. Mandelbaum RS, Adams CL, Yoshihara K, et al. The rapid adoption of opportunistic salpingectomy at the time of hysterectomy for benign gynecologic disease in the United States. In: *American Journal of Obstetrics and Gynecology*. ; 2020. doi:10.1016/j.ajog.2020.04.028
9. Venkatesh KK, Clark LH, Stamilio DM. Cost-effectiveness of opportunistic salpingectomy vs tubal ligation at the time of cesarean delivery. *Am J Obstet Gynecol*. Published online 2019. doi:10.1016/j.ajog.2018.08.032
10. Subramaniam A, Einerson BD, Blanchard CT, et al. The cost-effectiveness of opportunistic salpingectomy versus standard tubal ligation at the time of cesarean delivery for ovarian cancer risk reduction. *Gynecol Oncol*. 2019;152(1):127-132. doi:10.1016/J.YGYNO.2018.11.009
11. Mills K, Marchand G, Sainz K, et al. Salpingectomy vs tubal ligation for sterilization: a systematic review and meta-analysis. *Am J Obstet Gynecol*. 2021;224(3):258-265.e4. doi:10.1016/J.AJOG.2020.09.011
12. Yang M, Du Y, Hu Y. Complete salpingectomy versus tubal ligation during cesarean section: a systematic review and meta-analysis. *J Matern Fetal Neonatal Med*. 2021;34(22):3794-3802. doi:10.1080/14767058.2019.1690446
13. Roeckner JT, Sawangkum P, Sanchez-Ramos L, Duncan JR. Salpingectomy at the Time of Cesarean Delivery: A Systematic Review and Meta-analysis. *Obstetrics and gynecology*. 2020;135(3):550-557. doi:10.1097/AOG.0000000000003673
14. Garcia C, Martin M, Tucker LY, et al. Experience With Opportunistic Salpingectomy in a Large, Community-Based Health System in the United States. *Obstetrics and gynecology*. 2016;128(2):277-283. doi:10.1097/AOG.0000000000001531
15. Levy D, Casey S, Zemtsov G, Whiteside JL. Salpingectomy versus Tubal Occlusion for Permanent Contraception during Cesarean Delivery: Outcomes and Physician Attitudes. *J Minim Invasive Gynecol*. 2021;28(4):860-864. doi:10.1016/J.JMIG.2020.07.025
16. Simmons S, Alabaster A, Martin M, et al. Complete Salpingectomy or Bilateral Tubal ligation: Change in Sterilization Practice in The United States. *Gynecol Oncol*. 2017;147(1):234. doi:10.1016/j.ygyno.2017.07.113
17. Stickrath E, Alston M. A Novel Abdominal Hysterectomy Simulator and Its Impact on Obstetrics and Gynecology Residents' Surgical Confidence. *MedEdPORTAL*. 2017;13:10636. doi:10.15766/MEP_2374-8265.10636
18. Acosta T, Sutton JM, Dotters-Katz S. Improving Learners' Comfort With Cesarean Sections Through the Use of High-Fidelity, Low-Cost Simulation. *MedEdPORTAL*. 2020;16:10878. doi:10.15766/MEP_2374-8265.10878
19. Vlasblom JID, Pennings HJM, van der Pal J, Oprins EAPB. Competence retention in safety-critical professions: A systematic literature review. *Educ Res Rev*. 2020;30:100330. doi:10.1016/J.EDUREV.2020.100330

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