

A Novel Approach to Teaching Placement of a B-Lynch Suture: Description of Technique and Validation of Teaching Model

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Abstract

Introduction Postpartum hemorrhage is a major cause of maternal morbidity and mortality throughout the world and uterine atony is the leading cause of postpartum hemorrhage. The B-Lynch brace suture is a fertility-sparing approach to treating intractable uterine atony at the time of cesarean delivery. However, many obstetricians lack confidence to perform this procedure, which they may not have performed during residency. In order to train all residents to perform the B-Lynch brace suture, we developed a realistic model by using a flank steak to imitate a gravid uterus.

Methods A convenience sample of obstetrics-gynecology faculty and residents at different levels of training at a single large hospital participated in this pilot project. Each physician reported self-perceived understanding of and confidence in performing the B-Lynch procedure before and immediately after practicing

the technique using the flank-steak model, via a Likert-type survey (scale 1 = low, 5 = high). A Wilcoxon matched-pairs signed rank test was used to compare the before and after responses.

Results Thirty-four participants completed the flank-steak model training and pretraining/posttraining surveys. The median score (range) for self-perceived understanding was 4 (2–5) and increased to 5 (4–5) ($P < .01$) after exposure to the training model. The confidence scores rose from 3 (1–5) to 5 (4–5) ($P < .01$) after training.

Conclusion The flank-steak model for teaching the B-Lynch suture significantly improved resident and faculty self-perceived understanding of and confidence in performing this procedure, which is otherwise rarely practiced in residency.

Editor's Note: The online version of this article contains the materials and equipment necessary for construction and demonstration of the uterine model, the survey instrument used in this study, and 2 movies depicting the making and use of the B-Lynch brace suture model.

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Introduction

Maternal hemorrhage is a significant cause of maternal morbidity and mortality, accounting for 17% of all maternal deaths in the United States from 1991 to 1999.¹ Postpartum hemorrhage accounts for many of these cases of maternal hemorrhage, with uterine atony accounting for 75% to 90% of approximately 125 000 maternal deaths worldwide annually.² A number of fertility-sparing surgical techniques may be used after pharmaceutical and compression/tamponade attempts have been unsuccessful, but they are invasive and have the potential for adverse effects. Hypogastric artery ligation or embolization generally requires subspecialty surgical training. As a result, a number of potentially avoidable postpartum hysterectomies are likely occurring, often in young patients of low parity.

Consequently, a more recent fertility-sparing approach to treating intractable postpartum uterine atony is the B-Lynch brace suture, which has become the preferred surgical intervention in these cases. Surgeons have adopted this procedure because of its simplicity and effectiveness. Developed and first published in 1997 by Christopher



FIGURE 1 FOLDED FLANK STEAK

B-Lynch, the technique is thoroughly described and illustrated in his original article.³ However, despite a number of subsequent articles and textbooks that have described the technique, many surgeons find it difficult to comprehend unless they have had an opportunity to actually see the suture placed.⁴⁻⁶ A survey of recently accredited trainees in obstetrics and gynecology in the United Kingdom revealed that while 100% of graduates were confident in performing a simple total abdominal hysterectomy, only 42% felt that they would be able to place a B-Lynch suture.⁷ In response to the need for a realistic training model, we developed a simulation model for teaching this procedure to residents and practicing obstetricians. The goal of this study was to evaluate the model's ability to improve physician self-assessed understanding of and confidence in performing the procedure.

Methods

Setting and Participants

Residents, maternal-fetal fellows, and full-time faculty of Winthrop University Hospital were invited to participate. Participation was voluntary.

Intervention

The materials and equipment necessary for construction and demonstration of the uterine model are provided as online supplemental material. A flank steak weighing approximately 2¼ to 2½ lb is used to construct a postpartum uterus approximating an early third-trimester gestation. These can be purchased in most supermarkets for approximately \$8 to \$10 each and often come 2 to a package. The steak is initially folded in half and trimmed to represent a "lower uterine segment" and "dilated cervix" (FIGURE 1). The excised pieces of steak are placed in the "fundus" to produce a more 3-dimensional model. Next,

What was known

Postpartum hemorrhage is a major cause of maternal morbidity and mortality throughout the world, yet many obstetricians lack confidence to perform the B-Lynch brace suture to treat uterine atony.

What is new

A simple, realistic model using a flank steak to imitate a gravid uterus allowed residents and attendings in an obstetrics-gynecology program to be trained to perform the procedure.

Limitations

Single-site, small sample (12 residents and 22 attendings), and use of self-reports of understanding and confidence in lieu of actual assessments of skill in a real or simulated clinical situation.

Bottom line

A simple, affordable simulation significantly improved resident and faculty self-perceived understanding of, and confidence in, performing an important but relatively rarely used procedure.

both sides of the model are closed by running a continuous, locking suture of 0 or 1 nylon from each "corneal" area to the "cervical" opening. A 4- to 5-cm transverse incision is then made with a scalpel in the anterior wall of the "lower uterine segment." The model is now ready for use in a training session (FIGURE 2). Model construction takes 20 to 25 minutes and may be prepared on the day of the training session, or in advance, frozen, and thawed the night before. This flank-steak model has a consistency remarkably similar to postpartum myometrium. One model may be used repetitively by 15 to 20 trainees for 3 to 4 hours before needing to be replaced.

Several demonstration and training sessions were held in the labor and delivery physicians' lounge. All participants were notified of the time and place of the sessions by e-mail and fax. Institutional Review Board approval was obtained

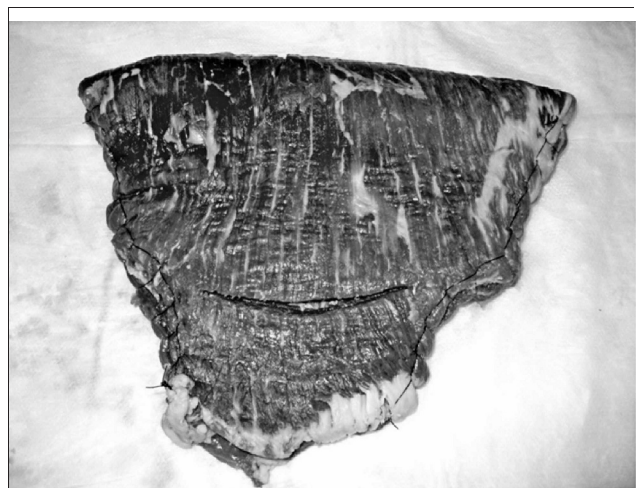


FIGURE 2 THE FLANK-STEAK MODEL

from Winthrop University Hospital Institutional Review Board.

Outcomes

Participants were asked to complete an anonymous survey (provided as supplemental online material). The survey collected physician demographics (resident and level, fellow and level, attending physician and years of experience), level of understanding of the B-Lynch suture, confidence in performing it (1 = low, 5 = high), and whether they had ever performed it before.

The understanding and confidence survey questions were administered before and immediately after the simulation practice session. The survey was developed by the authors and was not pilot tested or evaluated before its use.

Analysis

Data were analyzed by using the Wilcoxon matched-pairs signed rank test. "Experienced" and "nonexperienced" were defined as those with or without a history of placing a B-Lynch suture, respectively.

Results

A total of 34 of 49 trainees (69%) ($n = 12$) and attending physicians ($n = 22$) participated in 3 study sessions. Twenty-two of 34 participants (65%) had never performed a B-Lynch suture.

There was statistically significant improvement in self-perceived understanding of the B-Lynch suture for all participants post intervention ($P < .01$). Residents and fellows and those with no prior experience with the suture reported the most improved understanding, with median scores increasing from 3 to 5 for both ($P < .01$). The attending physicians as a group improved their understanding, with median scores increasing from 4 to 5 ($P < .01$). Those with prior experience placing a B-Lynch suture did not have improvement in their self-perceived understanding of the suture ($P < .06$).

After the intervention, there was statistically significant improvement in reported confidence to place a B-Lynch suture during an emergency for all participants: the attending physicians, the residents/fellows, and those without prior experience ($P < .01$ for all). Those with prior experience placing a B-Lynch suture did not have significant improvement in their confidence to place the suture ($P < .06$).

Discussion

The flank-steak simulation model of uterine atony significantly improved self-perceived understanding of and confidence to perform the B-Lynch suture for the residents, fellows, and attending physicians who had never performed the procedure. Sixty-five percent of physicians at this

institution had not previously performed the procedure. The simulation model was simple and quick to make, relatively inexpensive, and acceptable to physicians as measured by voluntary participation in this study.

Learning this procedure is essential if it is to be used appropriately in the typical emergency situation. If properly performed, this technique has a high success rate with rare complication.^{8,9} Becoming proficient in any surgical technique requires the opportunity to practice. This model allows both resident and attending obstetricians to sharpen their skills in performing the technique with confidence.

Our study has several limitations. Although the improvements in understanding and confidence were large, we did not correlate self-perceived understanding and confidence with actual correct suture placement in patients. As the need for this suture is rare, as well as emergent in nature, this correlation is not possible. However, a scoring system for experts to measure trainee performance is both possible and a next step in assessing the simulation model. Our model was tested at a single institution, limiting generalizability. Voluntary participation may have drawn those who learn best through simulation. Finally, the survey was developed without additional validity evidence, and participants may have interpreted the questions differently.

Conclusion

A simple flank-steak model of uterine atony increased resident, fellow, and attending physician self-assessed understanding of and confidence in performing the B-Lynch suture and can be adopted by other obstetrics-gynecology residency programs to teach this technique.

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