Perineal Laceration and Episiotomy Repair Using a Beef Tongue Model

Michelle Eston, MD, Alyssa Stephenson-Famy, MD, Hannah McKenna, Michael Fialkow, MD, MPH*

*Corresponding author: mfialkow@uw.edu

Abstract

Introduction: Declining rates of operative vaginal deliveries and routine episiotomy in obstetric practice, along with rising cesarean section rates, have decreased OB/GYN resident experience with episiotomy repair and obstetric anal sphincter injuries (OASIS). Simulation models are valuable educational tools in procedural training. Several models have been reported, each with its own limitations and benefits. **Methods:** We developed a 1-hour workshop to teach novice OB/GYN residents perineal laceration repair skills on a modified beef tongue model. The model required 5-10 minutes to assemble following written and video instruction, and learners had 30-50 minutes to practice using learner instructions. Learners were evaluated using a procedure checklist and global objective structured assessment of technical skills. To evaluate the session, we surveyed current faculty and residents, as well as residency graduates. **Results:** Between 2008 and 2017, an estimated 82 OB/GYN residents participated in this activity, and 95 participants and facilitators received the survey. Forty-one (59%) respondents agreed that this model was similar to repairing OASIS in clinical practice. Our trainees reported that the optimal time for simulated OASIS repair was the R2 and R3 years; however, 90% of respondents felt residents should be offered this simulation yearly. **Discussion:** Based on our survey of trainees, graduates, and faculty, we created a realistic simulated OASIS repair training, despite the limitation that the model lacked a rectum. Learners reported an interest in repeating the simulation frequently during residency to augment their clinical experience and increase perceived competence in third- and fourth-degree laceration repair by their graduation.

Keywords

Episiotomy Repair, Beef Tongue Model, Simulation, Women's Health, OB/GYN, Critical Care Medicine, Clinical Skills Assessment, OSCE, Clinical/Procedural Skills Training, Laboratory Education

Educational Objectives

By the end of this session, learners will be able to:

1. Correctly describe the four steps of repair of the rectal mucosa with appropriate suture material.
2. Describe and perform the four steps of reapproximation of the external anal sphincter with appropriate suture material, using the beef tongue model.
3. Perform a second-degree laceration repair including identification of the apex, continuous suture to close the vaginal defect and reapproximate the transverse perineal muscles, and subcuticular closure of the superficial perineal skin, using the beef tongue model.

Introduction

With declining rates of routine episiotomy and operative vaginal deliveries, there is also a decrease in advanced obstetric lacerations. This diminished case volume leads to fewer educational opportunities for OB/GYN, family medicine, and midwifery trainees to witness repair of obstetric anal sphincter injuries (OASIS).[1] The ACGME and the University of Washington's OB/GYN Residency Review Committee do not collect individual procedure data for resident tracking of OASIS repairs, but rates have been declining nationally.[2] Despite this decline in exposure during training, providers who care for women during delivery will, at some point, be confronted with the challenge of repairing complex OASIS. The quality of that repair may significantly influence a mother's subsequent development of fecal incontinence, pain, and sexual dysfunction. As these are all unwanted side effects of labor and delivery, obstetric trainees in all fields should be competent to repair these injuries and ideally master the skill prior to independent practice. As with other infrequent emergencies or procedures, simulation can be employed to supplement cases that are infrequently encountered in the clinic.

Several simulation models teaching perineal laceration repair have been developed, ranging from plastic bench simulators to live tissue models, but none have been published in *MedEdPORTAL*. Although both beef tongue and sponge perineum models have been shown to be effective at improving resident understanding and performance, the beef tongue model has thus far been more extensively studied.[3-5] The sponge perineum model is constructed from a two-layer car-washing sponge that is cut to demonstrate the basic perineal anatomy of a fourth-degree laceration. This low-cost model is easy to prepare, and the procedural steps are easy to demonstrate; however, the feel of the sponge does not reflect human tissue well.[6] In comparison, the beef tongue model more closely replicates the feel of perineal tissue and is preferred by OB/GYN residents.[7] Furthermore, the more-advanced beef tongue preparations allow for the simulation of all anatomic findings in real OASIS.[5,8] However, the beef tongue model is expensive and time consuming to prepare and cannot accommodate learners with religious or moral objections to meat products.

Because natural tissue simulation models have a limited number of uses, we believed that the additional face validity of having a simulated rectal mucosa did not significantly improve the training experience, particularly when model preparation time was considered. We developed an OASIS repair model using a modified beef tongue for OB/GYN residents based on recent American College of Obstetrician and Gynecologists (ACOG) evidence-based guidelines for the recognition, repair, and prevention of obstetric lacerations and use of episiotomy.[2]

Methods

Prior to the session, we distributed trainee instructions (Appendix A) for all learners to review. First, we instructed learners to read the ACOG Practice Bulletin[2] on OASIS repair in order to review the risk factors, evidence basis for suture material, antibiotic use, and other postoperative care topics. Second, we suggested that learners watch a video[9] on perineal laceration (then purchasable from ACOG, now posted on YouTube, and either way not required for this published version of the workshop) in advance of the training session.

The beef tongues were purchased prior to the session; if done so well in advance, they were frozen and later defrosted (which required up to 24 hours). Facilitators prepared the beef tongue model on the morning of the surgical skills session, following the written (Appendix B) or video (Appendix C) instructions, which outlined the supplies, equipment, and steps necessary to prepare the model in multiple resource settings. This modified beef

tongue model needed, with experience, only 5-10 minutes of preparation time and required two different tissues but effectively replicated the anatomic layers critical for repair. The model was set up as a second-, third-, or fourth-degree laceration repair, depending on the level of the learner. In theory, trainees could prepare the models, but we believed that the model preparation would not be instructive, so we had facilitators prepare the models to optimize the amount of time the trainees had to practice.

During the surgical skills lab, we situated four trainees at one table with four modified beef tongue models. Each beef tongue model was set in a suturing board that had a channel to allow the model to be held in place. In the middle of the table, we placed needle drivers, toothed and smooth pickups, suture scissors, a scalpel, and a needle box. We provided a variety of sutures, such as permanent and absorbable of varying gauges, for the learners to consider using. Learners were asked first to identify the relevant anatomy and then to describe their surgical approach to the OASIS repair created in the model (Appendix D). After making any necessary corrections to their plan, the facilitator observed the laceration repair. We allotted 30-50 minutes to complete the repair and found that some learners spent this time on a single repair, whereas others performed the repair two or three times.

The role of the facilitator was to use the performance checklist (Appendix E) to provide feedback on decision making and surgical technique as the repair was completed but to avoid telling learners how to do the procedure. The surgical skill lab was well lit, and learners were seated on stools so that the facilitators could remain standing and easily move between the workstations to assist and instruct. We found that a 2:1 ratio of learners to facilitators was most effective for real-time instruction and careful oversight of the repair. Following the repair, the facilitators also used the performance checklist to debrief with the learners by reviewing correct and incorrect steps in the repair and discussing areas in which learners felt confident or continued to struggle. For those who continued to struggle with OASIS repairs, we scheduled extra individual sessions with the beef tongue model, as necessary.

We evaluated the effectiveness of this simulation using several methods. Initially, after every session, we asked a follow-up survey question on the value of the session to the trainee as part of an ongoing self-assessment of our program. Later, we introduced a formal assessment of second-year trainees on the model as part of annual testing using the procedure-specific checklist (Appendix E) and an objective structured

Table 1. Demographics of Survey Respondents (*N* = 70)

Demographic	No. (%)
Level of training	
Current resident	26 (37)
Current faculty	8 (12)
Current fellow	19 (27)
Graduate	17 (24)
Year of residency (*n* = 26)	
1	7 (27)
2	7 (27)
3	6 (23)
4	6 (23)
Year of fellowship (*n* = 8)	
1	3 (38)
2	3 (38)
3	2 (25)
Years in practice (*n* = 36)	
<3	21 (58)
3-10	11 (31)
>10	4 (11)
Used beef tongue model for OASIS repair	55 (79)

Abbreviation: OASIS, obstetric anal sphincter injuries.

Table 2. Subjective Survey Responses

Question	M	SD
Comfort repairing OASIS (*N* = 68)[a]	5.9	2.7
Beef tongue is similar to OASIS (*N* = 50)[b]	6.3	1.7
Beef tongue model increased my comfort with OASIS repairs (*N* = 53)[b]	6.6	1.8

Abbreviation: OASIS, obstetric anal sphincter injuries.
[a]Rated on a 10-point scale (0 = *very uncomfortable*, 5 = *neutral*, 10 = *very comfortable*).
[b]Rated on a 10-point scale (0 = *strongly disagree*, 5 = *neutral*, 10 = *strongly agree*).

assessment of technical skills (OSAT; Appendix F) similar to that described by Siddiqui, Stepp, Lasch, Mangel, and Wu.[10] We also evaluated senior trainees on their performance of OASIS repairs while on clinical rotations and used this simulation for remediation, as necessary, during their twice-annual performance review. Finally, we surveyed (via REDCap) OB/GYN faculty, fellows, current OB/GYN residents, and recent residency/fellowship graduates with experience learning and training with the beef tongue model about their simulation training, clinical experience with OASIS repair, and opinion on optimal timing of simulation training.

Results

Of the 95 eligible participants who received the survey, 70 responded (response rate: 73%). Respondents included 26 current residents, eight fellows, 19 faculty, and 17 recent graduates (Table 1). The respondents estimated a median of five (range: 0-100) OASIS repairs in their lifetime and a median of two (range: 0-6) OASIS repairs per year. Fifty-five respondents reported training/teaching with the beef tongue model for OASIS repair (Table 1). Forty-one agreed that the beef tongue was similar to repairing OASIS in clinical practice (for more subjective

survey responses, see Table 2). Residents reported limited OASIS repair experience on clinical rotations (*Mdn* = 1, range: 0-7). Respondents felt that the optimal years in training for beef tongue simulation were R2 (86%), R3 (64%), and R1 (53%; Table 3). Although 90% of participants felt that annual OASIS simulation should be offered to residents, only 34% felt that faculty should be offered yearly simulation (Table 4).

Discussion

We present a beef tongue OASIS repair simulation model that was well received and had reasonable fidelity. Several other beef tongue models have been developed; however, we modified the existing models to reduce the preparation time without significantly compromising the similarity to clinical anatomy. Because the beef tongue model was not a direct substitute for clinical experience with complex laceration repairs, we coupled the hands-on simulation with assigned preparatory reading to introduce the fundamental elements of laceration repairs that would serve to optimize the educational value of the few clinical opportunities at our institution. Our method for preparing the beef tongue developed as a result of needing multiple models available for training more than four learners per hour. This model was implemented along with a procedure checklist and OSAT over a 10-year period and has been used by dozens of OB/GYN residents as part of our surgical simulation curriculum. To assess the acceptability of this model, we surveyed residents, fellows, faculty, and graduates, who felt that this model was acceptable and should be offered annually to residents.

Our study has several limitations. In terms of the model itself, the principal limitation in fidelity is its lack of a rectum. We hope

Table 3. Most Appropriate Time for Simulation Models for Instruction on Obstetric Laceration Repairs (*N* = 70)

Model[a]	Best Time: No. (%)							
	MS3	MS4	R1 Orientation	R1	R2	R3	R4	Fellowship/Faculty
Second-degree laceration	3 (4)	37 (53)	58 (83)	59 (84)	27 (39)	5 (7)	3 (4)	3 (4)
Third-/fourth-degree laceration	0 (0)	3 (4)	11 (16)	37 (53)	62 (86)	45 (64)	30 (43)	8 (11)

[a]Respondents chose their three best times for teaching each model.

Table 4. Frequency of Use of Simulation Model for Instruction on Obstetric Laceration Repairs (N = 70)

How Frequently Should the Third-/Fourth-Degree Model Be Offered?	Never, Does Not Add Value: No. (%)	Once: No (%)	Every Other Year: No. (%)	Annually: No. (%)	As Needed: No. (%)
For OB/GYN residents	0 (0)	0 (0)	6 (9)	63 (90)	1 (1)
For fellows	0 (0)	6 (9)	4 (6)	44 (63)	12 (23)
For faculty/attendings	1 (1)	3 (4)	13 (19)	24 (34)	29 (41)

in the future to develop a method to add a rectum in a simple but effective way so as to maintain the ease of preparation but improve the realism. Our measurements of effectiveness of the learning activity are also limited. Anecdotal feedback solicited from our graduates showed that many did not feel competent in OASIS repair by the time of their graduation; however, we did not have baseline comfort data surrounding OASIS repairs prior to the implementation of this training. Although our survey assessed whether the beef tongue model improved comfort with OASIS, it was not possible to accurately interpret these data given the lack of data on baseline comfort. Without a prospective study, asking residents to reflect on their initial level of comfort prior to the model would have introduced significant recall bias. Another limitation in our evaluation is the modest number of respondents (N = 70). Our program has only six or seven OB/GYN residents per year, so a prospective study of their training, comfort, and competence after graduation would be administratively challenging. Finally, we asked respondents to report on their number of OASIS repairs, and their responses were low, likely reflecting national trends. However, OASIS repairs are not directly tracked as a separate procedure by our OB/GYN Residency Review Committee, so we cannot directly compare our resident surgical volume to other programs nationally for this procedure.

Many lessons were learned from implementation of this simulation model. We believed that the models described previously, although anatomically more accurate in concept, were too time consuming for a faculty preceptor to prepare. Our model, like several others, was initially challenging to assemble, but with practice, we found that we could rapidly (5-10 minutes) prepare a model for practicing multiple degrees of laceration and that each model could be repaired five or six times. Even with multiple uses, this model can be expensive to implement annually for all trainees, and beef tongues can be difficult to procure. Another lesson learned was that it is possible to have upper-level residents facilitate the lab for lower-level residents doing second-degree perineal lacerations. However, in our experience, upper-level residents are not able to self-proctor or peer teach, as most have limited clinical experience with OASIS repair.

We believe the results of our study indicate that learners want this training in advance of or during their primary clinical experience and that the model is a reasonable representation of clinical reality and provides a valuable means of practicing the steps necessary to repair perineal lacerations. We developed the beef tongue model due to our recognition that the declining operative vaginal delivery rates and decrease in routine episiotomy use on our labor and delivery unit were providing our trainees fewer clinical opportunities to repair higher-order obstetric lacerations. We found that this preparation of the beef tongue model strikes a good balance between the cost-effective replication of an OASIS injury and reasonable time of preparation for simulation training.

Appendices

A. Beef Tongue Trainee Instructions.docx

B. Beef Tongue Model Preparation.docx

C. Beef Tongue Model Setup.mp4

D. Laceration Repair Using Beef Tongue Model.pptx

E. Laceration Repair Performance Checklist.docx

F. Beef Tongue OSAT.docx

All appendices are peer reviewed as integral parts of the Original Publication.

Michelle Eston, MD: Physician, Kaiser Permanente

Alyssa Stephenson-Famy, MD: Associate Professor, Department of Obstetrics and Gynecology, University of Washington School of Medicine

Hannah McKenna: Second-Year Medical Student, University of Washington School of Medicine

Michael Fialkow, MD, MPH: Associate Professor, Department of Obstetrics and Gynecology, University of Washington School of Medicine

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