Residents' experience and training in obstetric anal sphincter injury repair in the United States

Sujatha Narayanamoorthy,[1] Kimen Singh Balhotra,[1] Michael Silver,[2] Rodney McLaren Jr.,[3] Elishia McKay[4]

[1]Department of Obstetrics and Gynecology, Maimonides Medical Center, Brooklyn, New York; [2]Research Administration, Maimonides Medical Center, Brooklyn, New York; [3]Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, Sidney Kimmel Medical College, Thomas Jefferson University, Philadelphia, Pennsylvania; [4]Division of Female Pelvic Medicine and Reconstructive Surgery, Maimonides Medical Center, Brooklyn, New York, United States

Abstract

With the reduction in obstetric anal sphincter injuries (OASIS) cases, it is unknown if learning and exposure to their repair is compromised during obstetrics and gynecology (OBGYN) residency in the United States (US). The aim of this study was to evaluate the exposure and confidence level of the US OBGYN residents to OASIS repair. Residents' education on OASIS repair was also assessed. This was a cross sectional online survey that collected residents' demographics, characteristics of residency program, the number of deliveries and OASIS repairs performed, the site and technique of OASIS repair, post-repair care provided, residents' confidence level in OASIS repair and their education on the repair. Descriptive analyses, Fisher's Exact tests, Ordinal regression models and Spearman's correlation were performed. Response from 160 residents (11% response rate) was obtained. Confidence was higher with increasing level of training (OR=3.442, 95% CI, 2.473-4.791, p<0.004), a greater number of deliveries (OR=2.672, 95% CI, 1.511-4.723, p<0.001), third-degree repairs (OR=5.522, 95%CI, 3.67-8.308, p<0.001) and fourth-degree repairs (OR=4.364, 95% CI, 2.785-6.837, p<0.001) performed. Exposure to lecture or/and simulation improved confidence than no exposure to either (OR= 0.225, 95% CI, 0.092-0.545, p<0.001). Residents' confidence level increased with a greater number of simulations attended (r=0.368, p< 0.001). Lectures and simulations enhance residents' knowledge and skills in OASIS repair. Surgical skill curriculum is essential to maintain good quality training, prompt recognition, and meticulous perineal repair among OBGYN physicians despite the declining OASIS cases.

Introduction

Obstetric anal sphincter injuries (OASIS) that extend to or through the anal sphincter lead to complications like fecal incontinence, perineal pain, dyspareunia, and rectovaginal fistula.[1] This type of injury can compromise the quality of life and cause social stigma and embarrassment.[2] It becomes vital to recognize OASIS at the time of occurrence and repair them efficiently since primary sphincter repair of occult OASIS is more likely to be successful in the long term than a secondary repair performed remote from delivery.[3] There is a discrepancy between the reported incidence of OASIS and anal incontinence suffered due to obstetric injury. Clinical misjudgment can be improved with adequate training received during residency.[4] Learning repair of OASIS during residency training in the US is unknown. Hence, this study aimed to understand OBGYN residents' exposure to deliveries needing OASIS repair, the types of technique used, and care provided post-

repair using a cross-sectional survey. We also aimed to assess residents' confidence level and access to various training methods in OASIS repair.

Materials and Methods

A cross-sectional, online survey was developed to assess resident experience and education on OASIS repair. The link to this survey was emailed to all OBGYN training residency programs in the US between March and April 2021. The population of the sampling frame, being the residents currently enrolled in Accreditation Council for Graduate Medical Education (ACGME) accredited OBGYN residency programs, were requested to participate in the study. This study was approved by the hospital's Institutional Review Board (IRB) (#2020-12-07-MMC).

Since a validated survey to assess OBGYN residents' experience in OASIS repair does not exist, the authors created a survey consisting of 25 questions for the study. The survey consisted of questions on demographics of the residents, characteristics of their residency program, the number of deliveries, 3rd and 4th-degree repairs performed, the site and technique of OASIS repair and post-repair care provided, residents' confidence level in repairing 3rd and 4th degree perineal tears and exposure to different methods of training such as lectures and simulation used in their institution. A Likert scale was used that allowed respondents to select from options- 'Very confident,' 'Confident,' 'Somewhat confident,' and 'Not at all confident' in response to questions assessing their confidence level in performing OASIS repair. Open-ended questions that could be time-consuming and difficult to answer were eliminated from the survey. The survey was emailed to the program directors of the US OBGYN programs requesting them to forward the link to their residents. Each program received one email with the link to the survey. A request for read receipt was obtained. No follow-up email was sent. Survey participants were self-selected by clicking the link to an online consent form. Survey instructions stated that responses were anonymous, participation was voluntary, and the survey would take about ten minutes to complete. Responses to the survey were collected and stored using a secure web-based tool- Research Electronic Data Capture (REDCap).

Descriptive analyses were used to understand the demographic characteristics of the residents, type of training environment, the number of deliveries, 3rd- and 4th-degree repairs performed, site of repair, suture materials used, post-repair care, and follow-up provided. Univariable ordinal logistic regression models were created to assess the association between the number of years of experience, number of deliveries conducted, number of 3rd- and 4th-degree perineal repairs performed and to understand if lectures and/or simulations and the likelihood of increase in the residents' confidence. Spearman's correlation was performed to investigate if there was correlation between the number of simulations attended and the residents' confidence. All statistical analysis was performed with Stata/IC 16.1 (StataCorp LLC, Texas).

Results

A total of 6,070 OBGYN residents belonging to 286 residency programs was identified using FREIDA- The American Medical Association Residency and Fellowship database. Of the 286 OBGYN programs, 72 (25.1%) programs having 1450 residents acknowledged the receipt of the email. Of these 1450 residents, 160 (11%) residents completed the survey.

Table 1. Demographics and resident characteristics.

Demographic characteristics	Number of participants (N=160)
Age (years) [N=154]	29 [28-31]
Gender	
Female	144 (90)
Male	13 (8.13)
Transgender male	1 (0.63)
Gender variant	1 (0.63)
Prefer not to answer	1 (0.63)
Race/Ethnicity	
African American	7 (4.38)
Asian	21 (13.13)
Caucasian	105 (65.63)
Hispanic	16 (10)
Pacific Islander	2 (1.25)
Other	6 (3.75)
Prefer not to answer	3 (1.88)
Postgraduate year level	
1	35 (21.88)
2	36 (22.50)
3	50 (31.25)
4	39 (24.38)
Number of deliveries performed	
21-40	2 (1.25)
41-60	5 (3.13)
61-80	6 (3.75)
81-100	6 (3.75)
>100	141 (88.13)
Number of 3rd degree perineal tears performed	
0	27 (16.88)
1-2	49 (30.63)
3-4	47 (29.37)
5 and above	37 (23.12)
Number of 4th degree perineal tears performed	
0	95 (59.38)
1-2	50 (31.25)
3-4	9 (5.62)
5 and above	6 (3.75)
Primary training environment	
University based	85 (53.13)
Community based	67 (41.88)
Others	8 (5)
Region of training*[N=152]	
Northeast	61 (40.13)
South	28 (18.42)
Midwest	47 (30.92)
West	16 (10.53)
Residents with Fellowships	105 (65.6)
Site of repair	
OR	26 (16.25)
Labor and Delivery	127 (79.38)
Other	1 (0.63)
Don't know	6 (3.75)
Technique used	
Overlapping	19 (11.88)
End to end	87 (54.37)
Both Overlapping and end to end technique	15 (9.38)
Don't know	39 (24.37)
Routine Antibiotic given	
Yes	131 (81.88)
No	21 (13.13)
Unsure	8 (5)
Routine stool softener (N=157)	
Yes	154 (98.09)
No	0 (0)
Unsure	3 (1.91)

Data expressed as median [IQR] or N (%).

Demographics of the residents and characteristics of residency program

The median age of residents was 29 years old, Interquartile Range (IQR; Table 1).[28-31] The majority of residents were females (N=144, 90%) and Caucasians (N=105, 65.63%). Responses obtained from PGY 1, PGY 2, PGY 3 and PGY 4 year of residency was 35 (21.88%), 36 (22.50%), 50 (31.25%) and 39 (24.38%), respectively. About half of the residents were from a university-based residency program (N=85, 53.13%). Most respondents belonged to programs in the Northeast (N= 61, 40.13%), followed by institutions from the Midwest region (N=47, 30.92%) of the US. One hundred and five participants (65.62%) stated that they had fellowships in their program. Of the 160 residents, 141 (88.13%) had performed over 100 vaginal deliveries. The majority of the respondents had performed 1 to 2 third-degree perineal tear repairs (N=49, 30.63%) and no 4th degree perineal tear repairs (N= 94, 59.38%).

OASIS repair and post-repair care

The majority of the respondents repaired OASIS in the labor and delivery unit (N=127, 79.38%; Table 1). The most common method used by residents was the end-to-end technique (N=101 63.75%). The most common suture used for anal sphincter repair was 2-0 polyglactin (N=120, 75%) and for anal epithelium was 3-0 polyglactin (N=43, 36%). Most residents prescribed stool softeners (N=154, 98.09%) and antibiotics (N=131, 81.88%) after OASIS repair. The majority of the participants (N=94, 59%) routinely scheduled their patient's follow-up appointment in two weeks. Only 2 (1.2%) residents reported using an endo anal sonography (EAUS) to evaluate anal sphincter integrity after delivery.

Factors influencing residents' confidence in OASIS repair

Table 2 provides details on factors that influenced residents' confidence level. Residents' confidence in repair increased with increasing level of training (OR=3.44, 95% CI, 2.473-4.791, p<0.004), a greater number of deliveries performed (OR=2.672, 95%CI, 1.511-4.723, p<0.001), and with a greater number of third-degree repairs (OR=5.522, 95%CI, 3.67-8.308, p<0.001) and fourth-degree repairs (OR=4.364, 95% CI, 2.785-6.837, p<0.001). Their confidence in repair did not differ according to the type of teaching environment (N= 85, 53.13% residents in university hospital versus N=67, 41.88% residents in community hospital; p>0.99) nor the presence or absence of a fellowship in their program (N=105, 65.6% who had fellowship versus N=55, 34.4% who do not have a fellowship in their program; p=0.5624).

Table 3 provides details on residents' access to different types of education and exposure to simulation on OASIS repair. Lectures and simulation were the two types of education studied. Residents reported having exposure to lectures alone (N=16, 10%), simulations alone (N=8, 5%), both lecture and simulation (N=112, 70%), neither lectures nor simulation (N=24, 15%). Ordinal regression analysis showed having exposure to lecture and/or simulation improved residents' confidence compared to exposure to neither lectures nor simulation (OR= 0.225, 95% CI, 0.092-0.545, p<0.001) (Table 2). Regarding simulations, residents reported using one or combinations of mannequin (N=14, 11.66%), validated sponge model (N=30, 25%), beef tongue model (N=105, 87.5%), and others (N=9, 7.5%) such as: the American College of Obstetricians and Gynecologists (ACOG) video, cadaver, faculty created models, and pig models (N=9). Among those who responded to the number of simulations they attended (N=116), residents'

Table 2. Residents' confidence.

Variable	Odds Ratio (OR)	P value	95% Confidence Interval (CI)
Residency years	3.44	<0.001	2.47-4.79
Number of deliveries	2.67	<0.001	1.51-4.72
Number of 3rd degree cases	5.52	<0.001	3.67-8.31
Number of 4th degree cases	4.36	<0.001	2.79-6.84
Neither Simulation or lecture	0.23	<0.001	0.09-0.55
Simulation only	0.56	0.388	0.17-1.85
Lecture only	0.99	0.987	0.39-2.49

Table 3. Resident's access to education in OASIS repair. Data expressed as N (%).

	Respondents (N=160)
Education	
Lectures alone	16 (10)
Simulation alone	8 (5)
Lectures and simulation	112 (70)
Neither lecture nor simulation	24 (15)
Type of simulation (N=120)	
Mannikin	14 (11.66)
Validated sponge models	30 (25)
Beef tongue model	105 (87.5)
Others	9 (7.5)
Number of simulations attended (N=116)	
1	56 (48.28)
2	38 (32.76)
3	15 (12.93)
4	6 (5.17)
6	1 (0.86)

confidence level increased with a greater number of simulations attended (r=0.368, p<0.001).

Discussion

Our study demonstrates that residents enrolled in US OBGYN programs report increased confidence in OASIS repair with increasing level of training, greater exposure to deliveries and 3rd and 4th degree perineal tears. Integrating lectures and simulations to training was noted to be beneficial to residents since it helped to increase their confidence in OASIS repair. The residents' confidence also increased by attending a greater number of simulation sessions. Residents' confidence did not differ based on presence of fellowship in their program or the type of training program.

The vast majority of OASIS is occult and fails to be recognized in the labor and delivery at the time of occurrence. This indicates the necessity for more training opportunities for residents.[4,5] While a study conducted among 297 US OBGYN residents in 2005 revealed that 6.8% and 40.3% of the respondents had repaired more than 20 fourth-degree lacerations and third-degree lacerations respectively,[5] our study noted that only 3.75% and 23.12% of the residents had performed 3rd and 4th degree perineal tear repairs, respectively.

Training providers in OASIS repair is a challenge not only in the US but also across the globe. A survey conducted among Canadian providers felt that their residency training did not adequately prepare them to perform OASIS repairs in practice and the confidence improved only with increasing years of being an attending.[6]

These concerns highlight the need for integrating surgical skill curriculum to residency training. This would not only benefit in honing the skill of repair, but also help to improve recognition of OASIS at the time of occurrence. Prompt detection and timely repair aids in lowering OASIS complications.[1] Studies have shown that up to 87% of OASIS are missed at the time of occurrence.[7] Hence, exposure to hands-on workshop and simulations during training is critical in improving detection rate of sphincter injury.[8-10] Integrated workshops and simulations during residency help to understand perineal anatomy. Emmanuelli *et al.*[11] noted an improvement in the concepts of OASIS repair and perineal anatomical knowledge among residents after a structured hands-on training using cadaveric sow's anal sphincters. A study in the UK by Eston *et al.*[12] showed similar results in which the residents felt that simulation models closely represent clinical practice. Residents also stated that there is a need to be exposed to simulation models more frequently to help build confidence.[12] This was consistent with the findings of our study in which residents' confidence enhanced with a greater number of simulations attended.

Simulations can be conducted using any model in lieu of a live patient with adequate representation of perineal anatomy to practice identification and repair of OASIS. In our study beef tongue models were the most reported type of simulation used. Some of the other models used globally are cadaveric cows,[12] economical modified beef tongue model utilizing tripe and chicken leg muscles,[13] silicon model[14] and cadaveric porcine anal sphincters.[7]

In our study only 1.5% of the residents stated routine use of the EAUS. More research must be focused on understanding the use of EAUS and its importance. The EAUS is useful in delivery suite in case of unclear diagnosis of OASIS and can be utilized as a screening tool to check for integrity of anal sphincter.[15,16] This practice leads to improved primary repair of the external and internal anal sphincter resulting in reduced rates of anal incontinence and improved quality of life for women. The EAUS may also be used to evaluate residual injury after OASIS repair and may guide the management of subsequent pregnancies and allow early referral to specialized units, minimizing long term complications.

There are limitations and strengths to our study. It was difficult to determine an exact response rate because we do not know how many programs forwarded the survey invitation to their residents. However, we requested email receipts to help determine this. Response rate of 11% may possibly not be representative of all the US residents. However, our study had participation from diverse respondents belonging to different types of teaching environments who have performed over 100 deliveries in their training programs from all regions of the US. The study is based on self-reporting which could lead to information bias. The study did not objectively assess knowledge of perineal anatomy, the quality of repair, or complication rate of OASIS repair performed by residents. However, it must be noted that to our knowledge there are no recent studies in the US that assessed the residents' confidence in OASIS repair or analyzed their practice and exposure to teaching methods.

Conclusions

Increasing years in residency, greater exposure to deliveries with OASIS, lectures and simulations helped in resident education and built their confidence in OASIS repair. These findings suggest that OBGYN residency programs need to ensure that simulations are being conducted to enhance residents' knowledge and skills. More research is needed in the use and importance of the EAUS. Future studies partnering with the ACGME should evaluate the knowledge in perineal anatomy and objectively assess the residents' technique of OASIS repair.

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