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Obstetrical anal sphincter laceration and anal incontinence 5-10 years after childbirth

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Abstract

Objective—To investigate the long-term impact of anal sphincter laceration on anal incontinence.

Study Design—Five to ten years after first delivery, anal incontinence and other bowel symptoms were measured using the Epidemiology of Prolapse and Incontinence Questionnaire and the short form of the Colorectal-Anal Impact Questionnaire. Obstetrical exposures were assessed with review of hospital records. Symptoms and quality of life impact were compared between 90 women with at least one anal sphincter laceration, 320 who delivered vaginally without sphincter laceration and 527 who delivered by cesarean.

Results—Women who sustained an anal sphincter laceration were most likely to report anal incontinence (odds ratio 2.32; 95% confidence interval 1.27, 4.26) and reported the greatest negative impact on quality of life. Anal incontinence and quality of life scores were similar between women who delivered by cesarean and those who delivered vaginally without sphincter laceration.

Conclusion(s)—Anal sphincter laceration is associated with anal incontinence 5-10 years after delivery.

Keywords

Anal incontinence; Cesarean; Obstetrical anal sphincter laceration; Quality of life

Introduction

Anal incontinence is a distressing disorder afflicting 2-24% of community-dwelling adults.¹ Obstetrical anal sphincter laceration is a known risk factor for anal incontinence.

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Specifically, obstetrical anal sphincter laceration has been consistently associated with increased risk of anal incontinence in the first postpartum year.²⁻⁶ Long-term outcomes for women with anal sphincter laceration are less certain, although a higher prevalence of anal incontinence has been suggested.⁷⁻⁹ It is unclear whether vaginal birth, in the absence of sphincter laceration, increases a woman's risk of anal incontinence when compared to cesarean delivery. In the postpartum period, cesarean is thought to protect against anal incontinence,³ albeit incompletely.

In this study, we investigated anal incontinence after anal sphincter laceration among participants in the Mothers' Outcomes After Delivery (MOAD) study.¹⁰ In a population of parous women 5-10 years from first delivery, we compared anal incontinence in women who had sustained at least one anal sphincter laceration, women who delivered vaginally without sphincter laceration and women who delivered by cesarean. Our goal was to compare symptoms of anal incontinence, degree of bother and impact on quality of life across these exposure groups.

Materials and Methods

This is an analysis of baseline data collected for the Mothers' Outcomes After Delivery (MOAD) study, a prospective cohort study of pelvic floor outcomes in women recruited 5-10 years after delivery of their first child.¹⁰ Institutional review board approval was obtained for this research and all participants provided written, informed consent. Recruitment of women into the study began in 2008 and is ongoing.

This analysis was based on the original 1,011 women enrolled in the cohort. The study design and recruitment methods have been described in detail previously.¹⁰ To be eligible, women must have given birth to their first child at Greater Baltimore Medical Center 5-10 years prior to enrollment. Participants were identified from obstetrical hospital discharge records. To verify eligibility and to confirm delivery type, each hospital chart was reviewed by an obstetrician from our research team.

Exclusion criteria for the MOAD study (applied only to the index birth) included: maternal age <15 or >50 years, delivery at <37 weeks gestation, placenta previa, multiple gestation, known fetal congenital anomaly, stillbirth, prior myomectomy, and abruption. For this analysis, we also excluded four women with neurologic conditions that could contribute to bowel incontinence (i.e. multiple sclerosis and cerebral-palsy). Additionally, since we did not have access to obstetrical records for subsequent deliveries at other hospitals, we excluded multiparous women with deliveries that did not occur at our institution, leaving 937 women for this analysis.

The primary exposure of interest was obstetrical anal sphincter laceration, documented in the hospital record at the time of delivery. Based on obstetrical history of all deliveries prior to enrollment into MOAD, women were classified into one of three groups. The exposed group (Sphincter Tear Group) comprised women with at least one clinically recognized, third- or fourth-degree anal sphincter tear as defined by the American College of Obstetricians and Gynecologists.¹¹ There were two control groups. The first control group included women with at least one vaginal birth but without a clinically recognized anal sphincter laceration (Vaginal Control Group). A second comparison group included women who delivered only through cesarean (Cesarean Control Group).

In addition to these obstetrical exposures, we considered the following confounders: age at enrollment, race, maternal age at first delivery, multiparity, and obesity at the time of enrollment. Race and parity were self-reported at study enrollment. Each participant's weight

and height were measured and body mass index was calculated (weight/height²). Obesity was defined as a body mass index of 30 kg/m² or greater.

The primary outcome was anal incontinence, assessed at enrollment (e.g., 5-10 years after the first delivery). Anal incontinence symptoms were measured using the Epidemiology of Prolapse and Incontinence Questionnaire (EPIQ), a validated, self-administered questionnaire.¹² The EPIQ includes three questions that pertain to anal incontinence: “Do you lose gas from your rectum that is beyond your control?”; “Do you lose stool beyond your control if your stool is loose or liquid?”; and “Do you lose well-formed stool beyond your control?” For each symptom endorsed by the participant, she is asked to describe the degree of bother, rated using a visual analog scale ranging from “Not at all (0)” to “Greatly (100)”.¹² An overall anal incontinence score is calculated as the mean bother score for the three anal incontinence items. Prior research¹² demonstrated that an anal incontinence score greater than 22.8 points is sensitive and specific for identifying women with bothersome symptoms of anal incontinence. In this research, we used the published EPIQ anal incontinence threshold (score of 22.8) to distinguish women with and without anal incontinence.¹²

Additional information about anal incontinence is provided by the following EPIQ items: “Do you wear liners, pads, diapers, or toilet paper, or do you change your undergarments to protect your clothes from loss of stool?”; “Have you ever asked a doctor, nurse, or other healthcare professional for help with loss of stool or gas?”; and “Have you had any surgery to correct the loss of stool or gas?”¹² These items do not contribute to the anal incontinence score and were therefore considered separately in this analysis.

In addition, the EPIQ includes the following questions that pertain to other aspects of bowel function: “Do you ever have difficulty having a bowel movement?”; “Do you ever have to push on your vagina or around your rectum to have or complete a bowel movement?”; and “How often do you use laxatives or stool softeners (not including high fiber supplements like Metamucil)?” For each symptom endorsed by the participant, women are asked to describe the frequency of occurrence and degree of bother. For these items, the degree of bother is rated using a visual analog scale ranging from “Not at all (0)” to “Greatly (100)”.¹²

Finally, women with bowel symptoms were asked to rate the impact on their quality of life using the short form of the Colorectal-Anal Impact Questionnaire,¹³ or CRAIQ-7. This validated questionnaire provides a measure of the impact of bowel symptoms on seven domains of quality of life. The CRAIQ-7 was completed by participants answering “yes” to any of these six EPIQ bowel symptom questions: “Do you ever have difficulty having a bowel movement?”; “Do you ever have to push on your vagina or around your rectum to have or complete a bowel movement?”; “Do you lose gas from your rectum that is beyond your control?”; “Do you lose stool beyond your control if your stool is loose or liquid?”; “Do you lose well-formed stool beyond your control?”; and “Do you wear liners, pads, diapers, or toilet paper, or do you change your undergarments to protect your clothes from loss of stool?” Responses to the CRAIQ-7 are traditionally answered using a 4-point Likert scale with values “Not at all”, “Somewhat”, “Moderately”, or “Quite a bit”.¹³ To improve consistency within our survey, we modified the response options for the CRAIQ-7 from the traditional Likert scale to a visual analog scale matching that used for EPIQ degree of bother questions. Thus, each item from the CRAIQ-7 was scaled from 0 to 100, with 100 representing the greatest impact from colorectal/anal symptoms.

Tables were generated to estimate the univariable associations between the exposure groups of interest (Sphincter Tear, Vaginal Control, and Cesarean Control) and possible confounders and then to compare the answers to different bowel symptom questions across

the three groups. The analysis of CRAIQ-7 data is restricted to women who filled out the CRAIQ-7 questionnaire (i.e. those who answered yes to at least one of the six EPIQ bowel symptom questions). P-values were obtained using a Fisher's Exact test for categorical variables and a Kruskal-Wallis test for continuous variables. Odds ratios were calculated using logistic regression. For all analyses, $p \leq 0.050$ was considered statistically significant.

Results

Of 937 participants, 90 had experienced at least one anal sphincter laceration. There were 320 in the Vaginal Control Group and 527 in the Cesarean Control Group. Of the 90 participants classified in the Sphincter Tear Group, 87 women experienced one anal sphincter laceration, two women experienced two anal sphincter lacerations, and one woman experienced three anal sphincter lacerations. Of the 94 total anal sphincter tears, 79 occurred at first delivery (84%), 14 occurred at second delivery (15%), and one occurred at third delivery (1%).

Maternal recall was noted to be poor with respect to a history of anal sphincter laceration. Specifically, of 90 participants with documented lacerations, 26 women did not recall an anal sphincter tear. Conversely, 12 women recalled sphincter lacerations but there was no documentation of a sphincter laceration; in these cases, a lesser degree of perineal trauma was documented in the delivery record. In all cases in which there was a discrepancy between maternal recall and medical documentation, obstetrical records were re-reviewed independently by a second reviewer, and there were no cases in which the original review was found to be in error.

The median interval between first delivery and enrollment was 7.4 years (interquartile range 6.3, 8.9). Descriptive characteristics of the participants are presented by group in Table 1. The groups were similar with regards to age at enrollment, race, maternal age older than 35 years at first delivery, and multiparity. Women who delivered exclusively by cesarean had a higher prevalence of obesity ($p < 0.001$).

Prevalence of bowel symptoms and degree of bother by anal incontinence is presented in Table 2, by exposure group. Based on EPIQ anal incontinence score, 96 (10%) participants had anal incontinence (score ≥ 22.8). Compared to women in the Cesarean Control Group, women in the Sphincter Tear Group were significantly more likely to score above the EPIQ threshold for anal incontinence (odds ratio [OR] 2.32; 95% confidence interval [CI] 1.27, 4.26). Women in the Sphincter Tear group also were more likely to report incontinence of gas (OR 2.52; 95% CI 1.52, 4.18), liquid stool (OR 2.50; 95% CI 1.32, 4.76), and solid stool (OR 4.04; 95% CI 1.12, 14.61). Additionally, participants in the Sphincter Tear Group were more likely to report the use of liners, pads, or to change clothing to protect clothes from loss of stool (OR 3.86; 95% CI 1.55, 9.59). In contrast, the only difference in anal continence between the Cesarean and Vaginal Control groups was seen in the odds of incontinence of gas, which was increased in the Vaginal Control group (OR 1.65; 95% CI 1.16, 2.35). No difference was found between groups, in the proportion of women who had talked to a healthcare provider about anal incontinence (53 participants, 6%) or in the proportion who reported prior surgery to correct anal incontinence (3 participants, <1%).

Operative delivery was significantly more common in the Sphincter Tear group than the Vaginal Control Group (42% versus 13%, $p < 0.001$).¹⁴ We, therefore, considered the impact of operative delivery among women with and without a history of sphincter laceration. Within the Vaginal Control group, anal incontinence was similar between women with and without a history of operative delivery (10.5% versus 9.5%, $p = 0.813$). In contrast, in the Sphincter Tear group, there was a trend toward a higher rate of anal incontinence among

those with a history of operative delivery, although the difference was not statistically significant (21.6% versus 15.3%, $p=0.5894$).

Relative to the Cesarean Control Group, women in the Vaginal Control Group were less likely to report difficult bowel movements (OR 0.73; 95% CI 0.54, 0.98). A similar trend was seen with the Sphincter Tear Group (OR 0.61; 95% CI 0.37, 1.00). There was no difference between groups in the proportion of women who manually splint the vagina or rectum for defecation.

Table 3 shows the CRAIQ-7 quality of life scores among 449 women with at least one bowel symptom, including 48 women in the Sphincter Tear Group (53%), 146 in the Vaginal Control Group (46%) and 255 in the Cesarean Control Group (48%). Even among those reporting bowel symptoms, the majority indicated no impact on quality of life. For example, among 449 women with at least one bowel symptom, only 83 indicated any impact related to ability to do household chores. Among the seven impact domains, women with bowel symptoms were most likely to report feeling frustrated by bowel symptoms and were least likely to report impact related to ability to do household chores. The proportion of women experiencing a quality of life impact from bowel symptoms (i.e. impact score > 0) was not significantly different across the three exposure groups for any of the domains considered. However, of those who expressed any quality of life impact from bowel symptoms, women in the Sphincter Tear Group consistently reported higher degrees of impairment than those in the Vaginal and Cesarean Control Groups.

Comment

Our findings suggest that anal sphincter laceration is significantly associated with anal incontinence 5-10 years after a first delivery. Women who sustained an anal sphincter laceration were significantly more likely to meet our definition of anal incontinence and they were more likely to report individual incontinence complaints, including incontinence of gas, liquid stool, and solid stool. In addition, they were more likely to wear liners to protect against anal incontinence. While most of the women in our study did not report condition-specific impact on quality of life, among those who did report an impact, the impact was significantly greater in the Sphincter Tear Group. All of these results suggest that obstetrical anal sphincter laceration has a statistically and clinically significant negative impact on bowel continence for years after childbirth. Similar trends have been reported in European studies.⁷⁻⁹

Operative delivery is known to have an association with sphincter lacerations. Furthermore, prior research in this cohort has demonstrated an increased odds of anal incontinence after operative delivery compared to cesarean birth¹⁰ but not in comparison to spontaneous delivery.¹⁴ The results from the present analysis provide additional insights. Specifically, in the absence of a sphincter laceration, operative delivery did not significantly increase a woman's odds of anal incontinence. While there was a suggestion of an additive effect of sphincter laceration and operative delivery on the rate of anal incontinence, a significant effect was not identified. Taken together, these results suggest that anal sphincter laceration may be the mechanism by which operative delivery results in anal incontinence later in life.

The present study included a comparison group of women who had delivered only by cesarean. Interestingly, anal incontinence symptoms were similar in the Cesarean and Vaginal Control Groups. The only exception was incontinence of flatus, which was more common among women with at least one vaginal birth versus women delivered exclusively by cesarean. Overall, the similarities between the vaginal and cesarean control groups suggest that vaginal delivery, in the absence of anal sphincter laceration, is not a risk factor

for anal incontinence. However, the data from this report are limited to one point in time and additional differences may emerge as the cohort is followed longitudinally.

We found that women who delivered all their children by cesarean were more likely to report difficult bowel movements (although they were not more likely to report splinting to defecate). The mechanism for this difference is uncertain. To our knowledge, this outcome has not been previously examined after cesarean versus vaginal birth. Additional investigation would be required to confirm this observation and to further explore the possible reasons for this association.

A limitation of this study is the lack of prospective assessment of anal sphincter laceration. We relied on medical record documentation to identify lacerations. Misclassification of anal sphincter laceration is, therefore, possible due to under-diagnosis at the time of delivery, over-diagnosis, or poor documentation. However, misclassification, if present, would reduce the strength of the observed associations, in which case, the true effect of anal sphincter laceration might be greater than observed here. Another limitation is that no data were available regarding pre-delivery bowel symptoms. We also do not have information on other conditions that might affect bowel symptoms, such as inflammatory bowel disease. Finally, as this is an observational study, we cannot with certainty ascribe the incidence of anal incontinence to obstetric events.

Strengths of this study include the assessment of anal incontinence symptoms and quality of life with validated questionnaires, the use of a relatively large sample size with longer duration of follow-up than most prior studies, and the inclusion of both a Vaginal and Cesarean Control Group. Additionally, obstetrical events were defined by obstetric hospital records, rather than maternal recall. Verification of obstetrical history is critical: nearly one-third of the anal sphincter lacerations experienced by our study population were not reported by the participant. These results are in keeping with past research¹⁵⁻¹⁷ on the accuracy of maternal recall for certain obstetrical events. This result is an important factor to consider for studies that rely upon maternal report of events without medical record review.

Further research focusing on anal incontinence and quality of life with extended durations of follow-up will strengthen our understanding of the burden of this problem on women after childbirth. Longitudinal follow-up of the MOAD cohort is planned and will allow us to assess the long-term prognosis for women who reported mild symptoms at the time of enrollment and those who reported symptoms without impact on quality of life.

Our results also suggest an opportunity for enhanced dialogue between physicians and their patients who have sustained an obstetrical anal sphincter laceration. Although 19% of participants who had experienced an anal sphincter laceration had anal incontinence, only 9% reported having ever talked about their symptoms with a healthcare professional. This is similar to the findings of a population-based study, which suggested that only one-third of individuals with fecal incontinence discuss the problem with a physician.¹⁸ Thus, anal incontinence is underreported. Symptomatic patients can be helped to manage their condition through diet, bulking agents, and pelvic floor exercises.¹⁹ Given that women who sustain anal sphincter laceration are at higher risk for anal incontinence, health care providers should encourage these women to report anal incontinence symptoms and to seek intervention when symptoms are bothersome.

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Table 1

Characteristics of 937 study participants, by exposure group

Characteristics ^a	Sphincter Tear (n=90)	Vaginal Control (n=320)	Cesarean Control (n=527)	P-value ^b
Age at Enrollment, years	40.2 (35.8, 43.2)	39.9 (36.3, 43.1)	39.4 (35.7, 43.0)	0.770
Primary Race				
Caucasian	77 (86%)	268 (84%)	420 (80%)	0.509
Black	9 (10%)	40 (13%)	79 (15%)	
Other	4 (4%)	12 (4%)	28 (5%)	
Maternal age > 35 years at 1 st delivery	27 (30%)	89 (28%)	154 (29%)	0.880
Multiparous at enrollment	61 (68%)	237 (74%)	354 (67%)	0.095
BMI ^c 30kg/m ² at enrollment	11 (12%)	52 (16%)	169 (32%)	<0.001

^aData are presented as median (interquartile range) or n (%).^bP-values were obtained using a Kruskal-Wallis test for continuous variables, and a Fisher's Exact test for categorical variables.^cBMI=Body mass index= weight (kg)/(height(m))²

Table 2

Bowel Symptoms of 937 study participants, by exposure group

Symptoms ^a	Sphincter Tear (n=90)	Vaginal Control (n=320)	Cesarean Control (n=527)	P-value ^b
AI Score				0.011
0	59 (66%)	245 (77%)	427 (81%)	
> 0, < 22.8	14 (16%)	44 (14%)	52 (10%)	
22.8 (Anal Incontinence)	17 (19%)	31 (10%)	48 (9%)	
<i>OR (95% CI)^c</i>	<i>2.32 (1.27, 4.26)</i>	<i>1.07 (0.67, 1.72)</i>	<i>1 (ref)</i>	
Ever lose gas beyond your control?	28 (31%)	73 (23%)	80 (15%)	<0.001
<i>OR (95% CI)^c</i>	<i>2.52 (1.52, 4.18)</i>	<i>1.65 (1.16, 2.35)</i>	<i>1 (ref)</i>	
How much are you bothered by losing gas? (n=181)	57.0 (22.0, 94.0)	30.0 (19.0, 70.0)	50.0 (17.5, 82.0)	0.241
Ever lose liquid stool beyond your control?	15 (17%)	24 (8%)	39 (7%)	0.020
<i>OR (95% CI)^c</i>	<i>2.50 (1.32, 4.76)</i>	<i>1.02 (0.60, 1.72)</i>	<i>1 (ref)</i>	
How much are you bothered by losing liquid stool? (n=78)	90.0 (60.0, 100.0)	50.0 (4.5, 83.5)	66.0 (37.0, 97.0)	0.030
Ever lose well-formed stool beyond your control?	4 (4%)	0(0%)	6 (1%)	0.003
<i>OR (95% CI)^c</i>	<i>4.04 (1.12, 14.61)</i>	<i>N/A</i>	<i>1(ref)</i>	
How much are you bothered by loss of well-formed stool? (n=10)	52.5 (24.0, 80.0)	0.0 (NA)	50.0 (5.0, 79.0)	0.831
Ever have difficulty having a bowel movement?	24 (27%)	97 (30%)	197 (37%)	0.034
<i>OR (95% CI)^c</i>	<i>0.61 (0.37, 1.00)</i>	<i>0.73 (0.54, 0.98)</i>	<i>1 (ref)</i>	
Ever have to push on vagina/rectum to have bowel movement?	14 (16%)	54 (17%)	92 (17%)	0.924
<i>OR (95% CI)^c</i>	<i>0.87 (0.47, 1.61)</i>	<i>0.96 (0.66, 1.39)</i>	<i>1 (ref)</i>	
Wear liners, pads, etc., or do you change undergarments to protect clothes from loss of stool?	8 (9%)	8 (3%)	13 (2%)	0.013
<i>OR (95% CI)^c</i>	<i>3.86 (1.55, 9.59)</i>	<i>1.01 (0.42, 2.47)</i>	<i>1 (ref)</i>	
Talked to healthcare professional for help with loss of stool or gas?	8 (9%)	15 (5%)	30 (6%)	0.496
<i>OR (95% CI)^c</i>	<i>1.62 (0.72, 3.65)</i>	<i>0.82 (0.43, 1.54)</i>	<i>1 (ref)</i>	
Surgery to correct the loss of stool or gas?	1 (1%)	2 (1%)	0 (0%)	0.059

^aData are presented as n(%), median (interquartile range), or Odds Ratio (95% Confidence Interval).

^bP-values were obtained using a Fisher's Exact test for categorical variables, and a Kruskal-Wallis test for continuous variables.

^cUnadjusted odds ratios were calculated using logistic regression.

Table 3Quality of life among 449 women with at least one bowel symptom at baseline, by exposure group^a

	Sphincter Tear	Vaginal Control	Cesarean Control	P-value ^a
Women with bowel symptoms ^b , n (%)	48 (53%)	146 (46%)	255 (48%)	0.417
“Have you bowel/rectum symptoms affected your...” ^{cd}				
Ability to do household chores? ^{cd} (n=83)	10.5 (3.0, 24.0)	3.0 (1.0, 5.0)	5.0 (1.0, 10.0)	0.165
	n=10	n=26	n=47	
Physical recreation such as walking, swimming or other exercise? (n=112)	25.0 (15.0, 75.0)	6.0 (2.0, 20.0)	5.5 (2.0, 22.5)	0.002
	n=15	n=37	n=60	
Entertainment activities (movies, concerts, etc)? (n=102)	25.0 (10.0, 50.0)	3.0 (1.0, 10.0)	5.0 (2.0, 13.0)	<0.001
	n=14	n=31	n=57	
Ability to travel by car or bus more than 30 minutes from home? (n=97)	26.5 (7.5, 50.0)	3.0 (2.0, 10.0)	5.0 (1.0, 32.0)	0.015
	n=12	n=31	n=54	
Participating in social activities outside your home? (n=112)	14.0 (5.0, 50.0)	4.0 (1.0, 10.0)	4.0 (1.0, 11.0)	0.008
	n=15	n=38	n=59	
Emotional health (nervousness, depression, anger)? (n=113)	15.0 (6.0, 50.0)	5.0 (2.0, 37.0)	6.0 (2.0, 26.0)	0.118
	n=17	n=39	n=57	
Feeling frustrated? (n=199)	32.5 (12.0, 75.0)	15.0 (5.0, 50.0)	20.0 (5.0, 49.0)	0.066
	n=24	n=61	n=114	

^aP-Values are generated by a Kruskal-Wallis test of the median scores of women who answered > 0 across the 3 exposure groups, unless otherwise noted.

^bP-value obtained using a Fisher's Exact test.

^cCRAIQ-7 scores were scaled from 0= “Not at all” to 100= “Greatly.”

^dMedian (IQR) was calculated using only scores from women that gave an answer > 0.