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Evaluation of Pelvic Floor Symptoms and Sexual Function in Primiparous Women Who Underwent Operative Vaginal Delivery Versus Cesarean Delivery for Second-Stage Arrest

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Abstract

Objectives—This study aimed to compare the prevalence and severity of pelvic floor symptoms and sexual function at 1 year postpartum in women who underwent either operative vaginal delivery (OVD) or cesarean delivery (CD) for second-stage arrest.

Methods—In this cohort study, women with second-stage arrest in their first pregnancy who delivered between January 2009 and May 2011 at 2 different institutions were identified by an obstetric database using *International Classification of Diseases, Ninth Revision*, codes. Validated questionnaires evaluating pelvic floor symptoms and sexual function were administered. Subjects were dichotomized into those who underwent an OVD or a CD. Additional analyses by intent-to-treat and stratification of vacuum versus forceps operative deliveries were performed.

Results—Of the 109 women who completed the 1-year postpartum symptom questionnaires, 53 (48.6%) had a successful OVD, 20 (18.3%) failed OVD and underwent CD, and 36 (33%) underwent CD only. There were no differences between those who had a successful OVD and those who underwent a CD in either pelvic floor function or sexual function, but bulge symptoms were more common in the OVD group (7.5% vs 0, $P = 0.05$). When analyzed by intent-to-treat (planned OVD vs planned CD), pelvic floor symptoms remained similar between groups. However, those in the planned CD group reported higher orgasm and overall sexual satisfaction scores.

Conclusions—In this sample of primiparous women with second-stage arrest, mode of delivery did not significantly impact pelvic floor function 1 year after delivery, except for bulge symptoms in the OVD group and sexual satisfaction in the planned CD group.

Keywords

second-stage arrest; operative vaginal delivery; cesarean delivery; pelvic floor; sexual function

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The American Congress of Obstetricians and Gynecologists has defined a prolonged second stage of labor in nulliparous women as the lack of continuing progress for 3 hours with regional anesthesia or 2 hours without regional anesthesia.[1] It occurs in 11% of nulliparous women.[2] A prolonged second stage has been associated with a higher rate of maternal morbidity including perineal trauma, episiotomy, major hemorrhage during cesarean delivery (CD), and operative vaginal delivery (OVD).[3] The rates of OVD range from 5% to 20% of all births in industrialized countries,[4,5] with second-stage arrest accounting for approximately 79%.[4] A recent cohort study by Allen et al[6] concluded that many of the increased risks of a prolonged second stage of labor were independent of the method of delivery.

The optimal management of second-stage arrest of labor presents a challenge to most obstetricians. The relative risks and benefits of maternal and fetal outcomes for a trial of OVD versus CD are not clearly defined and are difficult to study prospectively. Vaginal delivery has been shown to have a negative impact on urinary incontinence, fecal incontinence, and pelvic organ prolapse compared with CD,[7–10] with a significantly higher prevalence of these disorders with OVD.[7,11] However, the risk of OVD compared with CD for women with second-stage arrest has only been reported in a single European trial by Liebling et al.[12] Randomized trials comparing OVD to immediate CD for women with second-stage arrest are lacking[5] but are also very challenging to conduct. The incident risk of pelvic floor disorders in this population could be attributed to events that occurred before delivery, such as prolonged pressure on the pelvic floor causing stretch and denervation injuries, or to the delivery itself. Although there is a paucity of data regarding the impact of mode of delivery on pelvic floor disorders in these women, even less is known about potential differences in sexual function.

The objectives of our study were to evaluate and to compare pelvic floor and sexual function at 1 year postpartum in women with second-stage arrest in their first delivery who underwent a trial of OVD versus CD. Symptoms of pelvic organ prolapse and sexual dysfunction, in particular, have not been reported in prior studies. In addition, the differences in pelvic floor and sexual symptoms between vacuum and forceps OVD and the potential effect of breastfeeding as a confounding variable were assessed.

MATERIALS AND METHODS

Institutional review board approval was obtained at the University of North Carolina at Chapel Hill (UNC) and Carolinas Medical Center—Charlotte main campus (CMC) for this cohort study. Women who delivered between January 2009 and May 2011 were identified by an obstetric database using *International Classification of Diseases, Ninth Revision*, codes. Eligible subjects were contacted for study participation and screened via telephone. Inclusion criteria were primiparous women 18 years or older with term cephalic pregnancies and confirmation of second stage of labor greater than 2 hours. Exclusion criteria were multiple gestations, pregnancies with fetal anomalies, being a non-English speaker, and being pregnant again at 1 year postpartum. A second stage of labor greater than 2 hours was established by chart review and confirmed by patient recollection before enrollment.

Subjects completed the telephone-validated Pelvic Floor Distress Inventory Short Form (PFDI-20)[13] and the Female Sexual Function Index (FSFI).[14] The PFDI-20 scores range from 0 to 300, and its pelvic organ prolapse subscale (POPDI-6), its colorectalanal subscale (CRADI-8), and urinary subscale (UDI-6) scores range from 0 to 100.[15] Higher scores indicate more dysfunction. Rates of urinary incontinence, anal incontinence, and prolapse symptoms were established by responses to the specific corresponding questions in this questionnaire. Pain symptoms were elucidated by evaluating responses to question 1 of the POPDI-6, "Do you usually experience pressure in the lower abdomen?," and question 6 of the UDI-6, "Do you usually experience pain or discomfort in the lower abdomen or genital region?" Bothersome symptoms were defined as a response of "somewhat," "moderately," or "quite a bit" bothersome. The FSFI is a non–condition-specific validated questionnaire that has 6 domains: desire, arousal, lubrication, orgasm, satisfaction, and pain. Higher scores indicate better sexual function. An FSFI total score of 26.55 has been set as a cutoff score for determining sexual dysfunction.[16] Women were also asked if they breastfed and for how long.

Demographics and delivery details were extracted from the electronic medical record: age, race, gestational age at index delivery, birth weight, fetal head presentation, station, Apgar scores, mode of delivery, type of labor (spontaneous or induced), presence of chorioamnionitis, degree and type of laceration, and length of hospital stay. Chart review was performed to confirm a second stage of labor greater than 2 hours. Subjects who did not meet these criteria were excluded.

Subjects were dichotomized into 2 groups: those who underwent a successful OVD (group 1) and those who underwent a CD (including failed OVD, group 2). Because we cannot predict whether those opting for OVD will be successful, we ran an intent-to-treat analysis (planned OVD included successful and failed OVD vs planned CD) to assess those planning for OVD versus those planning for immediate CD. Furthermore, stratification of vacuum versus forceps operative deliveries was performed.

A 2 1/2–year enrollment period was set to recruit subjects for this descriptive study. Statistical analyses were performed with SPSS, version 19.0 (Chicago, Ill) including Pearson χ^2 and Fisher exact test for categorical data and Student *t* test for continuous data.

RESULTS

There were 381 primiparous women with prolonged second stage based on provider coding. Based on chart review and patient recollection, 35 women were excluded because they did not actually have a prolonged second stage. After recruitment, an additional 9 women were excluded based on chart review because their second stage of labor was less than 120 minutes. Ultimately, there were 337 primiparous women with prolonged second stage who met inclusion criteria based on provider coding, patient recollection, and chart review during this period. Of these, 137 could not be contacted, 22 declined, and 69 were excluded because of multiple gestations, they were non-English speakers, or they were pregnant at the time of assessment. The UNC was responsible for 90% of participants, and CMC was responsible for the remaining 10% of participants. Of the 109 women who completed the 1-year

postpartum symptom questionnaires, 53 (48.6%) had a successful OVD, 20 (18.3%) failed OVD and underwent CD, and 36 (33%) underwent CD only. The proportions of women delivered by OVD and CD were not similar between the 2 institutions (UNC, 53% vs 47%; CMC, 10% vs 90%). Baseline demographics were similar between successful OVD and CD, but there were differences in delivery characteristics (Table 1). Those who underwent a CD had a higher birth weight, more non-occiput anterior presentation, higher station at time of arrest, more chorioamnionitis, and a longer hospital stay.

Overall pelvic floor dysfunction was low with the mean PFDI-20 score of 23.9 in the OVD group and 20.3 in the CD group. There were no differences between OVD versus CD groups in sexual function by FSFI scores. When analyzed by intent-to-treat, results remained similar between groups. However, the planned CD group reported higher orgasm scores (4.52 vs 3.78, $P = 0.05$) and overall sexual satisfaction scores (4.70 vs 4.16, $P = 0.044$) than the planned OVD group.

Specific pelvic floor symptoms were elicited at 1-year postpartum. Any urinary incontinence was reported in 39.4% of our sample. There was no difference based on mode of delivery. The rate of stress urinary incontinence was 24.8%, with 19.3% of women reporting bothersome stress incontinence. The rate of urge urinary incontinence was 21.2%, with 15.6% of women reporting bothersome urge incontinence. Any anal incontinence was reported in 24% of our sample. There was no difference based on mode of delivery. Flatal incontinence was reported in 17.4%, and loss of liquid or solid stool was reported in 9.2%. Bulge symptoms were reported in 3.7% of our sample. All women with postpartum bulge symptoms had undergone an OVD. Thus, bulge symptoms were more common in the OVD group compared with the CD group (7.5% vs 0%, $P = 0.05$). Sexual dysfunction, defined as an FSFI score of less than 26.55, was reported in 47% of the sample. There was no difference based on mode of delivery.

We then performed a subanalysis of the vacuum versus forceps deliveries. In the successful OVD group, there were 37 (69.8%) vacuum-assisted and 16 (30.2%) forceps-assisted deliveries. There was no difference in delivery characteristics between these 2 groups. There were 15 (28.3%) third- or fourth-degree perineal lacerations in the successful OVD group, with no difference between vacuum and forceps (27.0% vs 31.3%, $P = 0.751$). There were no differences in the rate of urinary, bowel, or sexual dysfunction symptoms between forceps and vacuum. However, women who underwent a forceps-assisted delivery had more prolapse symptoms based on POPDI-6 scores (8.85 vs 2.82, $P = 0.05$) and significantly higher rates of pressure and pain in the lower abdomen and vagina at 1 year postpartum (25% vs 2.7%, $P = 0.025$). A forceps-assisted delivery was associated with more than a 9-fold higher risk of lower abdominal pressure compared with vacuum-assisted delivery (relative risk, 9.3; confidence interval, 1.1–76.4; $P = 0.025$). This was also consistent in those analyzed by intent-to-treat with forceps-assisted attempts having higher rates of pain or discomfort in the lower abdomen or genital region compared with the vacuum-assisted attempts (18.2% vs 2.0%, $P = 0.027$).

Of the 108 subjects who discussed breastfeeding, 57.4% breastfed for 6 months or more. The rate of breastfeeding was not different between OVD and CD groups. Those who

reported breastfeeding for greater than 6 months had less dyspareunia overall (4.77 vs 4.02, $P = 0.05$).

DISCUSSION

In women with second-stage arrest in their first pregnancy, mode of delivery did not significantly impact pelvic floor function 1 year after delivery. Notable differences in pelvic floor symptoms between the 2 groups included more vaginal bulge symptoms in the OVD group, with lower orgasm and sexual satisfaction scores in the planned OVD group (intent-to-treat analysis). Variables associated with successful OVD included lower infant birth weight, lower station, absence of chorioamnionitis, and an occiput anterior head position.

Despite the potential for pelvic floor injury in this high-risk population, overall subjective complaints of pelvic floor dysfunction, as measured by the PFDI-20, were low. This questionnaire was validated in symptomatic older women in whom the mean score before treatment was 121.6 and the mean score after treatment was 50.2[15] as compared with mean scores of 23.9 and 20.3 in the OVD and CD groups, respectively. It is possible that subtle differences in pelvic floor symptoms between groups were not effectively measured using this instrument.

Urinary incontinence was the most prevalent pelvic floor disorder in our population at 39.4%, with bothersome urge and stress incontinence symptoms in 15% to 19% of our sample. Having a CD for the indication of second-stage arrest was not protective against this. Although OVD has been consistently identified as a significant and major risk factor for both stress and urge incontinence when compared with CD,[7,10,17] these studies did not selectively evaluate women with second-stage arrest, a population in whom pelvic floor injury may have preceded delivery. In the one existing prospective cohort study of women requiring operative delivery at full dilation, Liebling et al[12] did find that OVD was associated with a greater risk of urinary incontinence at 6 weeks (odds ratio, 7.8) compared with immediate CD. By 1 year postpartum, however, this had declined to a 3-fold increased risk.[12] Similarly, in a study of women 6 years after index delivery, persistent urinary incontinence was not higher in women with OVD.[18]

Although flatal incontinence was reported by 17.4% of our cohort, the rate of any fecal incontinence was 9.2%. Despite a 28% rate of anal sphincter lacerations in the OVD group, rates of anal incontinence were not significantly different between women delivered by OVD versus CD, a finding corroborated by Liebling et al.[12] The Childbirth and Pelvic Symptoms study found that women with sphincter tears reported more fecal incontinence and greater severity at both 6 weeks and 6 months postpartum, but this again was not compared with women undergoing CD for second-stage arrest.[9] Despite anal sphincter tears potentially serving as a proxy for more extensive pelvic floor injury, we observed no differences in pelvic floor or sexual symptoms in those that sustained these tears and those who did not. This is consistent with the findings of Brown et al,[19] who reported that OVD as compared with CD did not significantly alter the likelihood of fecal incontinence beyond the first 3 months postpartum.

The prevalence of pelvic organ prolapse has not been reported in women with a diagnosis of second-stage arrest, regardless of mode of delivery. In our cohort, we observed a higher rate of bulge symptoms in the OVD group that very likely is due to higher rates of levator ani injury in this group. A recent study that compared the differences in levator ani injury on magnetic resonance imaging in women with forceps delivery for fetal distress, forceps delivery for second-stage arrest, and spontaneous delivery found that major defects were seen in 42%, 63%, and 6%, respectively, implicating forceps, not delivery itself, as the affecting variable.[20] Handa et al[7] reported a significant association between OVD and prolapse in their epidemiologic study with the odds of having prolapse being over 7-fold in those who had at least 1 OVD. Those who had a forceps-assisted OVD had significantly higher rates of prolapse symptoms compared with those who had a vacuum-assisted OVD.

Women who undergo OVD are more likely to sustain a severe perineal laceration that may be associated with dyspareunia and an altered perception of vaginal anatomy than women delivered by CD. As a result, sexual function is an essential factor that requires evaluation. We found that women who underwent a planned, or immediate, CD at the time of second-stage arrest had higher orgasm and sexual satisfaction scores than those in the planned OVD group. Perhaps women who failed an operative delivery had increased pelvic floor neuromuscular trauma compared with women who did not attempt an operative delivery or those with a successful operative delivery. However, this is only postulation.

The limitations of this study are the inherent biases of a retrospective cohort design, relatively small sample size, un-blinded interviewers who were often informed of the delivery method by the study subject, and lack of objective clinical examination at 1 year postpartum. A post hoc power calculation was performed based on the study of Liebling et al that reported urinary incontinence rate of 17% in the OVD group and 5.4% in the CD group at 1 year postpartum, and our sample was underpowered for this at 47%. Our recruitment was limited by the rate of second pregnancy in the potential study subjects. Thus, we set a 2 1/2-year period for study enrollment. Selection and reporting bias may have affected the observed rates of pelvic floor disorders and sexual dysfunction. Those who participated may have been more interested in the study because of the nature of their delivery and their current symptoms.

The strengths of this study include the use of validated pelvic floor and sexual symptom questionnaires, a significant difference between our study and that of Liebling et al,[12] the 1 year follow up, and the inclusion of 2 study sites, which could improve the generalizability of the results. In addition, the use of a strict definition for second-stage arrest that was established by provider coding and confirmed by chart review and patient recollection offers an accurate sample for women who underwent second-stage arrest.

In conclusion, we found that, in women with second-stage arrest, OVD was not associated with increased rates of pelvic floor symptoms at 1 year postpartum compared with CD except for bulge symptoms. The difficult choice of how to proceed in this circumstance should not be influenced by the notion that CD is protective of the pelvic floor in these women. Specific elements of sexual function, however, may be improved with immediate CD. Although the long-term implications of these delivery choices are not known, the

findings that we elicited at 1 year postpartum may be useful when counseling women with second-stage arrest.

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TABLE 1

Baseline Demographics and Delivery Characteristics

Demographics	Group 1 (Successful OVD), n = 53	Group 2 (Underwent CD), n = 56	*P*
Age, mean(SD), y	28.8 (5.7)	29.5 (5.0)	0.48*
Race, n (%)			
White	43 (81)	44 (79)	0.95†
African American	5 (9)	4 (7)	
Hispanic	1 (2)	2 (4)	
Asian	3 (6)	5 (9)	
Other	1 (2)	1 (2)	
Gestational age at delivery, mean (SD), wk	39.9 (1.1)	40.0 (1.3)	0.84*
Type of labor, n (%)			
Spontaneous	16 (30)	12 (21)	0.63†
Spontaneous with augmentation	23 (43)	27 (48)	
Induced	14 (26)	16 (29)	
Fetal head presentation, n (%)	n = 42	n = 29	
OA	30 (71)	25 (86)	<0.01‡
Non-OA	12 (29)	4 (14)	
Station, n (%)	n = 49	n = 42	
≥+2	47 (96)	18 (43)	<0.01‡
<+2	2 (4)	24 (57)	
Time in second-stage arrest, mean (SD), min	192 (40)	178 (50)	0.15*
Birth weight, mean (SD), g	3394 (461)	3641 (576)	0.02*
Apgars, mean (SD)			
1 min	7.1 (2.0)	6.9 (2.8)	0.66*
5 min	8.7 (0.7)	8.5 (1.3)	0.38*
Chorioamnionitis, n (%)	4 (7.5)	16 (28.6)	0.01‡
Length of stay (calendar days), mean (SD)	3.7 (0.8)	5.1 (1.3)	<0.01*

*Student *t* test.

†Fisher exact test.

‡Pearson χ^2.

OA, occiput anterior.