Defining an at-risk population for obstetric anal sphincter laceration

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OBJECTIVE: The purpose of this study was to calculate the number of cesarean deliveries needed to prevent 1 case of obstetric anal sphincter laceration associated with operative vaginal delivery in an at-risk cohort.

STUDY DESIGN: An institutional, computerized database was used to analyze women with obstructed labor who could have been managed by either operative vaginal or cesarean delivery from September 2006 to March 2008. Women with 1 or more of the following diagnoses comprised the cohort: cephalopelvic disproportion (CPD), arrest of descent, maternal exhaustion, and fetal distress.

RESULTS: Fifty (23.9%) out of a total of 209 women managed by operative vaginal delivery experienced an anal sphincter laceration compared to none of 254 women in the cesarean delivery group ($P < .0001$). The ARR therefore was 23.9% (95% confidence interval, 18.1–29.7) and the NNT was 4.2 (95% confidence interval, 3.4–5.5).

CONCLUSION: Five cesarean deliveries are needed to prevent 1 anal sphincter laceration associated with operative vaginal delivery in this cohort.

Key words: anal sphincter laceration, arrest of descent, cesarean delivery, operative vaginal delivery, pregnancy

Cite this article as: Minaglia SM, Kimata C, Soules KA, et al. Defining an at-risk population for obstetric anal sphincter laceration. Am J Obstet Gynecol 2009;201:526.e1-6.

Obstetric anal sphincter lacerations (third-degree or fourth-degree perineal lacerations) are the leading cause of fecal incontinence in young women.[1,2] A number of observational studies suggest that modifiable risk factors, such as operative vaginal delivery and episiotomy, may increase the risk of obstetric anal sphincter laceration.[3-10] Cesarean delivery often becomes the only alternative to operative vaginal delivery in circumstances of obstructed labor or where immediate delivery may be necessary. The protection of the pelvic floor, in particular the prevention of anal sphincter laceration, must be balanced against the morbidity associated with cesarean delivery.

Identifying which patients are at increased risk of anal sphincter laceration remains a challenge. Women with diagnoses such as arrest of descent, maternal exhaustion, cephalopelvic disproportion, and fetal distress represent a group in whom the choice among mode of delivery may exist. The objective of the current study is to calculate the number of cesarean deliveries needed to prevent 1 case of obstetric anal sphincter laceration associated with operative vaginal delivery in women with at least 1 of the 4 diagnoses.

Materials and Methods

The Kapi'olani Medical Center for Women and Children began entering perinatal clinical data, abstracted from computerized medical records of mothers and neonates, into a computerized database in 2000. Effective 2006, these perinatal clinical data became fully integrated with admissions, discharge, and coded data to form a complete perinatal database. The purpose of the perinatal database was to integrate information on maternal, fetal, and neonatal outcomes. Data were periodically reviewed for agreement and were available to investigators for secondary analyses. Each patient's personal identifying information was removed for confidentiality. The institutional review board of Hawaii Pacific Health and the Kapi'olani Medical Center for Women and Children approved the study.

Information from the perinatal database that included all deliveries occurring between Sept. 1, 2006, and March 15, 2008, was used to identify and analyze women with obstructed labor that could have been managed by either operative vaginal delivery or cesarean delivery. Women with at least 1 of the following coded diagnoses comprised the 'at risk' cohort for this analysis: cephalopelvic disproportion (CPD), arrest of descent, maternal exhaustion, and fetal distress. Use of these diagnostic terms was at the discretion of the attending physician and was not specifically defined. Women in the 'at risk' cohort who had cesarean delivery were compared to women who had operative vaginal delivery with respect to the primary outcome, anal sphincter laceration. Women were excluded if they had a vaginal twin delivery, a cesarean delivery of a second twin, or an unsuccessful operative vaginal delivery managed by cesarean delivery.

Third- and fourth-degree perineal lacerations were combined into the single outcome for analysis referred to as anal sphincter laceration. Third-degree lacer-

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Presented at the 35th Annual Scientific Meeting of the Society of Gynecologic Surgeons, New Orleans, LA, March 30-April 1, 2009.

Received Jan. 7, 2009; revised May 31, 2009; accepted July 8, 2009.

Reprints not available from the author.

0002-9378/$36.00

doi: 10.1016/j.ajog.2009.07.021

TABLE 1
Frequency (%) and mean (SD) of characteristics for OVD and CD groups

Variables	OVD (n = 209)	CD (n = 254)
Anal sphincter laceration[b]		
Yes	50 (23.9)	0 (0)
No	159 (76.1)	254 (100)
Admitted year		
2006	43 (20.6)	71 (28.0)
2007	136 (65.1)	144 (56.7)
2008	30 (14.4)	39 (15.4)
Mom's age, y	28.7 (6.7)	29.0 (6.0)
Mom's weight, lb[b]	161.0 (30.9)	184.4 (43.9)
Parity		
0	162 (77.5)	197 (77.6)
≥1	47 (22.5)	57 (22.4)
Episiotomy[b]		
Done	108 (51.7)	0
Not done	101 (48.3)	254 (100)
Pitocin before delivery[b]		
Yes	142 (68.0)	222 (87.4)
No	67 (32.0)	32 (12.6)
Epidural		
Yes	176 (84.2)	211 (83.1)
No	33 (15.8)	43 (16.9)
Maternal length of stay, d[b]	2.6 (0.8)	4.1 (1.8)
Gestational age, wk	38.9 (4.4)	38.9 (1.5)
Birthweight, g[a]	3304.5 (486.4)	3481 (493.0)
Birth height, in[a]	20.5 (1.1)	20.7 (1.1)

CD, cesarean delivery; *OVD*, operative vaginal delivery.

[a] Statistical significant difference between OVD and CD ($P < .001$); [b] statistical significant difference between OVD and CD ($P < .0001$).

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ations were defined as an obstetric laceration involving any portion of the anal sphincter complex. Fourth-degree perineal lacerations were defined as an obstetric laceration involving any portion of the rectal mucosa.

Practitioners at Kapi'olani Medical Center for Women and Children included obstetrics and gynecology residents, midwives, generalist obstetricians, and attending physicians. Interns and residents performed the majority of deliveries and were directly supervised by attending physicians.

The absolute risk reduction for obstetric anal sphincter laceration and number needed to treat were computed after subtracting the laceration rate in the cesarean delivery group from the laceration rate in the operative vaginal delivery group in the 'at risk' cohort. The number needed to treat was the inverse of the absolute risk reduction. Differences between the 2 cohorts were assessed using χ^2 and Fisher exact tests for categorical data and the *t* test for continuous data. Agreement between clinical data and coded data was assessed using the Kappa statistic. Statistical analyses were performed using SAS 9.1.3 software (SAS Institute, Cary, NC).

RESULTS

During the 18-month period there were 7862 vaginal deliveries and 2327 cesarean deliveries for a total of 10,189 deliveries. The cesarean delivery rate was 22.8% and did not change significantly during the study period. The number of operative vaginal deliveries was 653, or 6.4% of all deliveries. Three hundred and twenty-nine anal sphincter lacerations occurred, and 50 of them occurred in the 'at risk' cohort.

A total of 503 women with 1 or more of the 4 coded diagnoses were initially identified. One hundred and ten were diagnosed with CPD, 172 with arrest of descent, 244 with maternal exhaustion, and 4 with fetal distress. Thirty women had more than 1 diagnosis. Three women were excluded because they had an unsuccessful operative vaginal delivery managed by cesarean delivery although none of these women experienced an anal sphincter laceration. Thirty-seven of the remaining 500 women in the 'at risk' cohort had a normal spontaneous vaginal delivery instead of an operative vaginal or cesarean delivery. These women did not meet criteria for these diagnoses given their mode of delivery, and were excluded from direct comparison with either the operative vaginal or cesarean delivery groups. Additional demographic and obstetric characteristics of the 463 study subjects are summarized in Table 1. APGAR scores were similar between the 2 groups.

Operative vaginal delivery was performed in none of the women with CPD, 20 (9.6%) women with arrest of descent, 192 (91.9%) women with maternal exhaustion, and 3 (75%) women with fetal distress. Utilization of the diagnoses arrest of descent, CPD, and maternal exhaustion was significantly different between the operative vaginal and cesarean delivery groups (Table 2).

Fifty out of a total of 209 women managed by operative vaginal delivery experienced an obstetric anal sphincter laceration compared to none in the cesarean delivery group ($P < .0001$). None of the women in the cesarean delivery group had an anal sphincter laceration documented in the chart by the provider. The