

## THE ASSOCIATION BETWEEN SPECIFIC PARTURITION EVENTS AND URINARY INCONTINENCE IN LATER LIFE: RESULTS FROM A RETROSPECTIVE COHORT STUDY

### Hypothesis/Aims of study

While vaginal birth is a widely recognized risk factor for urinary incontinence (UI) in later life, little is known re the association between specific parturition events and later UI. Studies have reported an association between post-partum UI and specific parturition events, such as type of anesthesia or use of forceps, though results have been inconsistent.[1-2] While most women with UI in the post-partum period regain continence, it has been suggested that specific parturition events may continue to contribute to the risk of UI in later life, as aging diminishes physiologic reserves.[3] Our study examined associations between specific parturition events and UI in middle-aged and older women.

### Study design, materials and methods

The Reproductive Risks for Incontinence Study at Kaiser (RRISK) is a retrospective cohort study of women between 40 and 69 years of age as of January 1, 1999 who have been members since age 18 of Kaiser Permanente Medical Care Program of Northern California, a pre-paid group practice with over 3 million members, about 25% of general population in the area served. A random sample of women was generated from membership files. Women were screened and recruited with the goal of obtaining weighted sample with equal numbers in each 5 year age strata and a distribution of 40% white, 20% Hispanic, 20% Asian and 20% African-American participants. Women were excluded if they did not speak English or Spanish, reported having had less than half of their births within Kaiser, were no longer members of Kaiser, had moved out of the area, or were demented or otherwise too impaired to participate. Eligibility could not be determined for 1326 women. Of 2817 women determined to be eligible, 2109 (74.9%) were enrolled. Questionnaires ascertained variables including age, self-reported race/ethnicity, a detailed description of current UI, medical and surgical history, pregnancy and parturition history, menopausal status, hormone replacement, health habits, general health, and demographics. Weight and height were measured by the interviewer and used to calculate body mass index (BMI) in kg/m<sup>2</sup>. Labor and delivery records, archived since 1945, were abstracted by professional medical record abstractors. Current UI was defined as at least monthly incontinence for the past 12 months and was further characterized as monthly, weekly and daily. Type of incontinence was defined for those women with at least weekly incontinence, according to their response to two questions, one asking if UI occurred "with an activity like coughing, lifting, sneezing or exercise" (stress incontinence) and the other asking if UI occurred "with a physical sense of urgency" (urge incontinence). For purposes of analysis, stress incontinence was defined as the majority of UI episodes in the past 7 days being stress related; similarly urge incontinence was defined as the majority of episodes being urge related. Women reporting no episodes of UI in the past 12 months were considered continent. Bivariate associations of parturition events and UI were assessed using logistic or proportional odds models. Variables associated with incontinence at  $p \leq 0.2$  were evaluated for inclusion in a multiple logistic regression model. Variables whose inclusion resulted in a meaningful (generally  $\geq 10\%$ ) change in the estimated association between any racial/ethnic group and incontinence were retained in the model. Age and parity were included by default in all models. Continuous variables were also assessed as categorical variables to maximize the opportunity for detecting confounding. All analyses were carried out in SAS Version 8.02 (SAS Institute, Cary, NC). Additional, exploratory analyses were performed using recursive partitioning to search for combinations of parturition exposures that were associated with increased probability of UI.

### Results

Of the 2109 participating women, 1521 reported at least one vaginal birth and are included in the analysis. The mean age was 56.1  $\pm$  8.5 years; 46% were Caucasian, non-Hispanic, 19% were African-American, 18% were Hispanic (predominately of Mexican origin), and 16% were Asian. Exposure to specific parturition events are shown in the table for women with UI  $\geq$  weekly compared to continent women. All exposures, with the exception of ever having had a 3<sup>rd</sup> or 4<sup>th</sup> degree tear, were associated with UI in the bivariate (unadjusted) analysis, though the association was statistically significant only for 'ever being induced,' and 'ever having pudendal anesthesia.' In multivariate analysis, only 'ever being induced' remained significant. When analysis was restricted to comparing women with only stress UI, a similar pattern was seen in the bivariate analysis, while in the multivariate analysis, only 'ever pudendal anesthesia' remained significant (OR=1.4, 95% CI=1.0 to 2.0).

**Table 1. Risk of UI  $\geq$  weekly associated with ever having experienced specific parturition events**

Exposure	$\geq$ Weekly UI N=459 % (n)	Continent N=408 % (n)	Unadjusted OR (95% CI)	Adjusted OR* (95% CI)
Ever induced (n=135)	18.5 (85)	12.2 (50)	1.6 (1.1 to 2.3)	1.6 (1.04 to 2.4)
Ever 1 <sup>st</sup> stage >12 hours (N=152)	18.7 (86)	16.1 (66)	1.2 (0.8 to 1.5)	0.9 (0.6 to 1.3)
Ever 2 <sup>nd</sup> stage >1 hour (N=187)	23.7 (109)	19.1 (78)	1.3 (1.0 to 1.8)	1.3 (0.9 to 1.9)
Ever oxytocin (N=257)	30.3 (139)	28.9 (118)	1.1 (0.8 to 1.4)	1.02 (0.7 to 1.4)
Ever episiotomy (N=761)	89.1 (409)	86.2 (352)	1.3 (0.9 to 1.8)	0.7 (0.4 to 1.3)
Ever 3 <sup>rd</sup> or 4 <sup>th</sup> degree tear (N=131)	14.6 (67)	15.7 (64)	0.9 (0.6 to 1.3)	0.9 (0.6 to 1.3)
Ever pudendal anesthesia (N=301)	38.3 (176)	30.6 (125)	1.4 (1.1 to 1.8)	1.1 (0.8 to 1.5)

\*adjusted for age, race, hysterectomy, estrogen use, BMI, parity, other parturition variables

Exploratory analysis using recursive partitioning found that age at first delivery  $\geq 23$  years and birth weight  $\geq 3177$  grams identified a subgroup of women with a high prevalence of  $\geq$  weekly UI (64% vs 42% in all women). Similarly, age at first delivery  $\geq 23$  years and birth weight  $\geq 3026$  grams identified a subgroup of women more likely to have stress UI (41% vs. 28%). No factors of similar importance were found which identified women with a high prevalence of urge incontinence.

**Interpretation of Results**

Our results are consistent with the literature on parturition events and risk of post-partum incontinence in that individual several individual events were associated with an increased risk of UI, but the associations were mostly weak to moderate in magnitude and not statistically significant. In multivariate analysis, only ever having been induced remained associated with weekly UI later in life and ever having had a pudendal anesthesia remained associated with weekly stress UI, which is consistent with a prior study which reported that epidural or spinal anesthesia were protective for post-partum UI [2]. Recently, it has been reported that while parity is a significant risk factor for UI in women below about age 60, its association is weaker in women above after age 55 to 60. Unfortunately, we did not have sufficient number of subjects to investigate age as an effect modifier.

**Concluding message**

We were not able to identify specific parturition events that clearly increased the risk of UI in later life. It remains possible that there are specific events that increase UI risk for women in a somewhat younger age group (e.g., 35 to 55), perhaps by effectively causing the UI to develop earlier than it would have otherwise. A larger study, dedicated to women in this age group, is needed to evaluate this possibility.

**References**

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2. Baydock SA, Flood C, Schulz JA, MacDonald D, Esau D, Jones S, Hiltz CB. Prevalence and risk factors for urinary and fecal incontinence four months after vaginal delivery. *J Obstet Gynaecol Can* 2009;31(1):36-41
3. Thom DH, Brown JS. Reproductive and hormonal risk factors for urinary incontinence: review of the clinical and epidemiologic literature. *J Am Geriatr Soc*, 1998;46:1411-7

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<b><i>Is this a clinical trial?</i></b>	<b>No</b>
<b><i>What were the subjects in the study?</i></b>	<b>HUMAN</b>
<b><i>Was this study approved by an ethics committee?</i></b>	<b>Yes</b>
<b><i>Specify Name of Ethics Committee</i></b>	<b>Committee on Human Research, University of California, San Francisco</b>
<b><i>Was the Declaration of Helsinki followed?</i></b>	<b>Yes</b>
<b><i>Was informed consent obtained from the patients?</i></b>	<b>Yes</b>