

## OBSTETRICS

## Mode of delivery after obstetric anal sphincter injury and the risk of long-term anal incontinence

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**BACKGROUND:** Primiparous women have an increased risk of obstetric anal sphincter injury; because most of these patients deliver again, there are major concerns about mode of delivery: the risk of recurrent obstetric anal sphincter injury and the risk of long-term symptoms of anal incontinence. Although an elective cesarean delivery protects against recurrent obstetric anal sphincter injury, it is uncertain how the second delivery affects the risk of long-term anal incontinence.

**OBJECTIVE:** The purpose of this study was to evaluate whether the mode of delivery for a second pregnancy, after a documented obstetric anal sphincter injury at the time of first delivery, had a significant impact on the prevalence of anal and fecal incontinence in the long term.

**STUDY DESIGN:** We performed a population-based questionnaire cohort study that evaluated anal and fecal incontinence, fecal urgency, and affected quality of life caused by anal incontinence in 1978 patients who had obstetric anal sphincter injury in the first delivery and a second vaginal (n = 1472 women; 71.9%) or elective cesarean delivery (n = 506 women; 24.7%) delivery. We performed uni- and multivariable logistic regression analyses to compare groups.

**RESULTS:** Long-term anal incontinence was reported in 38.9% of patients (n = 573) with second vaginal compared with 53.2% (n = 269) with elective cesarean delivery. The corresponding numbers that reported anal incontinence before the second pregnancy was 29.4% for those with vaginal delivery compared with 56.2% of those with elective cesarean delivery (ie, there was a significantly larger change in the risk of anal incontinence in the group with a second vaginal delivery compared with

the change in the group with elective cesarean in second delivery). However, adjusted for important maternal and obstetric characteristics, the risk of long-term anal incontinence was nonsignificantly lower in patients with elective cesarean delivery (adjusted odds ratio, 0.77; 95% confidence interval, 0.57–1.05;  $P = .09$ ). Furthermore, the risk of fecal incontinence was not affected by mode of delivery in the multivariable analysis (adjusted odds ratio, 1.04; 95% confidence interval, 0.76–1.43;  $P = .79$ ). Patients with persistent anal incontinence before the second pregnancy (n = 496) had an increased risk of long-term anal incontinence (adjusted odds ratio, 64.70; 95% confidence interval, 42.85–97.68;  $P < .001$ ) and long-term fecal incontinence (adjusted odds ratio, 13.76; 95% confidence interval, 10.03–18.88,  $P < 0.001$ ) compared with patients without anal incontinence before the second pregnancy.

**CONCLUSION:** Mode of second delivery did not significantly affect the risk of long-term anal or fecal incontinence in multivariable analyses of patients with previous obstetric anal sphincter injury in this population in which patients with anal incontinence before the second pregnancy were recommended to have an elective cesarean delivery in the subsequent delivery. Nonetheless, we found that patients with vaginal delivery had a higher risk of deterioration of anal incontinence symptoms compared with those with an elective cesarean delivery.

**Key words:** anal incontinence, cesarean delivery, fecal incontinence, mode of second delivery, obstetric anal sphincter injury

Obstetric anal sphincter injuries (OASIS) are serious complications to vaginal deliveries and cause long-term anal incontinence (AI), which is defined as involuntary leakage of flatus, liquid, and/or solid stool, in up to 50% of the patients.<sup>1–4</sup> In Denmark, the risk of OASIS in primiparous women has been increasing from 6.1% in 2000 to 7.4% in 2010.<sup>5</sup> In second pregnancies, patients with previous OASIS have 2 main concerns: the risk of recurrent OASIS and the risk of the development of AI after

second delivery. In Denmark, the risk of recurrent OASIS is 7.1% (95% confidence interval, 6.5–7.7%).<sup>6</sup> Some studies have found that a second vaginal delivery, with or without recurrent OASIS, increases the risk of AI,<sup>1,7–11</sup> whereas others have found that second vaginal delivery does not increase the risk.<sup>12,13</sup> Moreover, 1 of these studies found that recurrent OASIS does not increase the risk of AI.<sup>12</sup> These results question that second vaginal delivery and recurrent OASIS increases the risk of AI in patients with OASIS. However, most of these studies have a small number of included patients, and only a few studies have investigated whether an elective cesarean delivery (CS) in the second pregnancy protects against long-term AI when compared with a vaginal delivery.<sup>2,13</sup>

Accurate information to patients with OASIS is necessary to give appropriate

counseling regarding long-term outcomes. Our primary objective was to evaluate whether the mode of second delivery, after a documented OASIS at the time of first delivery, had a significant impact on the prevalence of AI and fecal incontinence (FI) after the second delivery.

### Materials and Methods

We performed a postal questionnaire cohort survey and included all women with 2 consecutive deliveries from January 1, 1997, to December 31, 2005, in Denmark where the first delivery was complicated by OASIS. The questionnaire was sent to all women in the study between September 15, 2010, and May 31, 2011. The study was approved by the Danish National Board of Health (J.nr. 7-505-29-1562), and written informed consent was obtained by all participants.

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OASIS was classified according to the Royal College of Obstetricians and Gynaecologists classification where a *third-degree OASIS* is defined as a partial or complete disruption of the anal sphincter muscles, which may involve either or both the external and internal anal sphincter muscles; a *fourth-degree OASIS* is defined as a disruption of the anal sphincter muscles with a breach of the rectal mucosa.<sup>14</sup> OASIS was identified by the International Classification of Diseases, 10th edition, codes O70.2 and O70.3 or by the surgical code KMBC33 from the Danish medical birth registry. These codes in the registry have been validated by medical records in the same time period.<sup>15</sup> In the analyses, we were not able to differentiate between partial and complete third-degree OASIS because this differentiation was not present in the Danish Medical Birth Registry at this time.

The questionnaire was based on a validated questionnaire by Due and Ottesen.<sup>16</sup> The questionnaire included questions regarding AI and related symptoms only and was divided in 2 sections. In the first, we asked the patients whether they had experienced AI in the time period between the first delivery with OASIS until the onset of the second pregnancy (yes/no); AI was classified as incontinence of flatus, liquid, and/or solid stool, and information was retrieved on whether the AI persisted until the onset of the second pregnancy (“Did you experience leakage [incontinence] of gas or feces when you became pregnant with your second child?” [yes/no]). These answers were then merged into 1 category with 3 possible answers: “no AI before the second pregnancy”/“transient AI before the second pregnancy”/“persistent AI at the onset of the second pregnancy.” This first section was included to adjust for the occurrence of AI before the second pregnancy, because the obstetrics practice in Denmark is to recommend elective CS if the patient experiences transient or persisting AI after a first delivery with OASIS. In the second section of the questionnaire that concerned current symptoms only, we asked questions regarding *fecal urgency* (defined as inability to defer defecation

for 15 minutes), difficulty to wipe clean after defecation, ability to differentiate between gas and stool in the rectum, whether they experienced anal pain during or after defecation, and whether they experienced AI. Those who experienced AI were asked to differentiate the type of AI in flatus incontinence, incontinence of liquid, and/or incontinence of solid stool. Patients were also asked whether they experienced fecal leakage without realizing this until later and if the AI affected their quality of life. The questionnaire was validated by interviews and test-retest. Patients were sent a reminder after 1 month.

Based on results by Nordenstam et al,<sup>1</sup> we performed a power calculation (Supplemental Table 1) to detect differences regarding *severe incontinence* (defined as involuntary loss of flatus for >1/week or daily or loss of feces (with any frequency))<sup>1</sup> between those women with vaginal delivery or elective CS. We found that 2000 patients were needed to obtain a power of 80%.

Data regarding obstetric and maternal characteristics regarding first and second delivery were obtained from the Danish Medical Birth Registry. Patients with premature delivery, patients with >2 deliveries, breech presentation, inflammatory bowel disease, patients who did not understand written Danish, patients with AI before first delivery, patients who had undergone surgical treatment because of AI, and patients who did not answer the first section of the questionnaire were excluded. Moreover, we excluded patients with “emergency CS” (ie, those patients who were elected for a trial of labor or planned vaginal delivery that ended up with CS).

Both the questionnaire (Supplemental Table 2) and the database (Supplemental Table 3) were validated.

We evaluated 2 primary outcomes. The first primary outcome was long-term AI (ie, a positive answer to the question “Do you experience involuntary leakage of gas or stool?” [yes/no] at the time of answering the questionnaire) that was sent out several years after the second delivery). The second primary outcome was long-term FI (ie, FI at the

time of answering the questionnaire). This outcome was based on 2 questions (“Do you experience involuntary leakage of liquid stool?” and “Do you experience involuntary leakage of solid stool?”). A positive answer to 1 or both of these questions yielded a “yes” in the primary FI outcome, whereas negative responses to both questions yielded “no.” Secondary outcomes were responses to the remaining specific questions regarding other symptoms that were present at the time of answering the questionnaire (ie, long-term outcomes; Table 1).

### Statistical methods

Differences between groups were examined with the use of the Mann-Whitney test or the Fisher’s exact test. We performed univariable logistic regression analyses to determine crude odds ratios and multivariable logistic regression analyses to determine adjusted odds ratios. Multivariable analyses were performed to evaluate whether the mode of the second delivery and other explanatory variables affected the primary outcomes: long-term AI and FI or the secondary outcomes (Table 1). The multivariable analyses were adjusted for important maternal and obstetric characteristics: mode of second delivery (vaginal or elective CS); maternal age (per year); grade of OASIS in first delivery (third- or fourth-degree); birthweight (per kilogram) in first and second delivery; and time period (per year) since first and second delivery. All these explanatory variables were extracted from the Danish Medical Birth Registry. The multivariable analyses were also adjusted for whether the patient reported AI before the second pregnancy (no AI/transient AI/persistent AI), based on answers in the first section of the questionnaire.

In separate analyses, we included another variable of AI before the second pregnancy (no AI/flatus incontinence/FI before the second pregnancy). In these analyses, the AI variable of no/transient/persistent AI before the second pregnancy was excluded.

We also performed subgroup analyses that included only patients with persistent AI at the onset of the second

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