

# Type of Labour in the First Pregnancy and Cumulative Maternal Morbidity

Victoria M. Allen, MD, MSc,<sup>1</sup> Thomas F. Baskett, MB,<sup>1</sup> Colleen M. O'Connell, PhD<sup>2</sup>

<sup>1</sup>Department of Obstetrics and Gynaecology, Dalhousie University, Halifax NS

<sup>2</sup>Perinatal Epidemiology Research Unit, Dalhousie University, Halifax NS

## Abstract

**Objective:** To estimate cumulative maternal morbidity among women who delivered at term in their first pregnancy on the basis of type of labour in the first pregnancy.

**Methods:** Using a 25-year population-based cohort (1988 to 2012) derived from the Nova Scotia Atlee Perinatal Database, we determined the type of labour in successive pregnancies in low-risk, nulliparous women at term in their first pregnancy (who had at least one subsequent pregnancy), and the maternal outcomes in subsequent deliveries based on the type of labour in the first pregnancy.

**Results:** A total of 36 871 pregnancies satisfied inclusion and exclusion criteria, 1346 of which were delivered by Caesarean section without labour in the first pregnancy. Rates of most adverse maternal outcomes were low ( $\leq 1\%$ ). The type of labour in the first pregnancy influenced the subsequent risk of postpartum hemorrhage and blood transfusion, and the risks increased with successive deliveries when labours were spontaneous in onset or were induced. The risks for abnormal placentation were low with subsequent deliveries, including following CS without labour in the first pregnancy, and risks for overall severe maternal morbidity were less than 10% for all subsequent deliveries.

**Conclusion:** The absolute risks for severe maternal morbidity outcomes in a population of women without a high number of subsequent pregnancies were small (regardless of type of labour in the first pregnancy); this provides important information for women, families, and caregivers when considering pregnancy outcomes related to type of labour.

## Résumé

**Objectif :** Estimer la morbidité maternelle cumulative chez les femmes qui ont accouché à terme dans le cadre de leur première grossesse, en fonction du type de travail au cours de celle-ci.

**Méthodes :** En utilisant une étude de cohorte de 25 ans en population générale (de 1988 à 2012) issue de la *Nova Scotia Atlee Perinatal Database*, nous avons déterminé le type de travail dans le cadre des grossesses successives chez des femmes exposées à de faibles risques qui ont accouché à terme dans le cadre de leur première grossesse (et qui ont connu au moins une autre grossesse), ainsi que les issues maternelles dans le cadre des accouchements subséquents, en fonction du type de travail dans le cadre de la première grossesse.

**Résultats :** Au total, 36 871 grossesses ont satisfait aux critères d'inclusion et d'exclusion (dont 1 346 qui se sont soldées en une césarienne sans travail dans le cadre de la première grossesse). Les taux de la plupart des issues indésirables maternelles étaient faibles ( $\leq 1\%$ ). Le type de travail dans le cadre de la première grossesse a exercé une influence sur le risque subséquent d'hémorragie postpartum et de transfusion sanguine; de plus, les risques ont connu une hausse dans le cadre des accouchements successifs lorsque le travail était spontané ou qu'il était déclenché. Les risques de placentation anormale étaient faibles dans le cadre des accouchements subséquents, y compris à la suite d'une césarienne sans travail dans le cadre de la première grossesse; les risques de morbidité globale grave chez la mère étaient inférieurs à 10 % pour tous les accouchements subséquents.

**Conclusion :** Au sein d'une population de femmes n'ayant pas connu un nombre élevé de grossesses subséquentes, les risques absolus de morbidité maternelle grave étaient faibles (peu importe le type de travail dans le cadre de la première grossesse); cela offre d'importants renseignements aux femmes, aux familles et aux soignants lorsque les issues de grossesse sont envisagées en fonction du type de travail.

**Key Words:** Maternal morbidity, Caesarean section, labour

Competing Interests: None declared.

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## INTRODUCTION

Caesarean section has been shown to be an independent risk factor for adverse maternal outcomes, including infection, hemorrhage, trauma to maternal tissues, and thrombosis, as well as subsequent adhesion formation and abnormal placentation and, more rarely, peripartum hysterectomy and maternal death.<sup>1-5</sup> Chronic morbidities associated with CS may also include pelvic pain and adhesions and an increase in the risk of adverse reproductive effects, including decreased fertility, increased risk of spontaneous abortion, and ectopic pregnancy.<sup>2</sup>

In previous studies we have demonstrated that maternal outcomes are worse when CS occurs after induction of labour, during the second stage of labour, and with longer durations of the second stage<sup>6-8</sup>; those studies did not account for the influence of multiparity or previous CS on maternal morbidity. When later pregnancies are considered, CS in labour for the first delivery is associated with increased cumulative costs compared with other methods of delivery, regardless of the number or type of subsequent deliveries.<sup>9</sup> Women undergoing CS are less likely to have a subsequent pregnancy<sup>10</sup>; however, among those who are eligible for a trial of labour and who attempt vaginal birth after Caesarean, two thirds successfully achieve a vaginal delivery,<sup>11</sup> and success is influenced by the indication for first CS.<sup>12</sup> Severe maternal morbidity such as obstetric hemorrhage, placenta previa or accreta, and critical care admissions progressively increases as the number of previous Caesarean sections increases,<sup>5</sup> especially for women with five or more Caesarean sections.<sup>3</sup> With broadening indications for CS, including Caesarean upon maternal request (without labour), the implications of type of labour in the first pregnancy for cumulative risks with subsequent pregnancies becomes more relevant for women, families, caregivers, and health resource provision.<sup>5</sup>

This study was designed to estimate cumulative severe maternal morbidity in subsequent deliveries related to the type of labour in the first pregnancy, using comprehensive obstetrical data from the Nova Scotia Atlee Perinatal Database.

## METHODS

This population-based cohort study employed data derived from the Nova Scotia Atlee Perinatal Database (NSAPD) over the 25 year period from 1988 to 2012. The NSAPD is a provincial, population-based, clinically oriented computerized database with information on pregnancy outcomes, and is known to be accurate and reliable.<sup>13,14</sup> Maternal and newborn data (such as demographic variables, procedures, maternal and newborn

diagnoses, and morbidity and mortality information) are available for every pregnancy and birth ( $\geq 500$  g or  $\geq 20$  weeks' gestation) occurring in Nova Scotia hospitals and to residents of Nova Scotia since 1988. Health records personnel abstract the information using NSAPD coding definitions from standardized prenatal forms and hospital patient care records across Nova Scotia, and all information is entered into the database soon after the time of collection. The province of Nova Scotia has a homogeneous, predominantly Caucasian population of approximately one million, with approximately 9000 live births each year,<sup>15</sup> and the population of Nova Scotia is covered by a universal health service. Intrapartum care in Nova Scotia is provided by consultant obstetricians, family physicians, and midwives. Consultant obstetricians attend all operative vaginal deliveries and Caesarean sections; obstetrical postgraduate trainees or family physicians are surgical assistants. Midwives have practised obstetrical care in Nova Scotia only since 2009.

The low-risk obstetrical population used in this study was defined by inclusion and exclusion criteria. Pregnancies were included if there was a live singleton at term (37 to 42 weeks) born to a nulliparous woman in the first pregnancy who had at least one subsequent delivery in the NSAPD at  $\geq 37$  weeks' gestational age. Pregnancies were excluded if in the first pregnancy there was a major fetal anomaly, if there was non-vertex presentation with spontaneous or induced labour, or if there was pre-existing maternal disease, antepartum hemorrhage, or small for gestational age ( $< 10$ th percentile birth weight for gestational age, based on a Canadian fetal growth reference).<sup>16</sup>

Maternal summary characteristics included maternal age, smoking status, pre-pregnancy weight, gestational age at delivery, and year of delivery. Weight at delivery (and therefore gestational weight gain) is known to have a high proportion of missing values in the NSAPD. Maternal morbidities included primary postpartum hemorrhage ( $> 500$  mL if vaginal delivery and  $> 1000$  mL if CS), blood transfusion of packed red blood cells, placenta previa, placenta previa accreta, placenta accreta (no previa), infectious morbidity (puerperal febrile morbidity, endomyometritis, positive blood cultures, fever  $> 38^{\circ}$  C on 2 occasions over 48 hours), venous thromboembolism (pulmonary embolism or deep vein thrombosis), uterine rupture (complete), hysterectomy, disseminated intravascular coagulation, third- or fourth-degree perineal lacerations, and need for transfer for intensive care. A composite outcome variable including any of the outcome variables (other than postpartum hemorrhage or infectious morbidity that could not be classified as severe based on coding definitions) was also evaluated, as was maternal mortality.

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