

Predicting the Spontaneous Onset of Labour in Post-Date Pregnancies: A Population-Based Retrospective Cohort Study

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Abstract

Objective: To estimate the probability of spontaneous onset of labour (SOL) among women with uncomplicated pregnancies who have reached 41+0 weeks and to examine the influence of maternal characteristics on this event.

Methods: We conducted a population-based retrospective cohort study of women with uncomplicated singleton pregnancies in cephalic presentation between 41+0 and 42+0 weeks' gestation. Detailed clinical information was obtained from the British Columbia Perinatal Data Registry. We determined the time from 41+0 weeks to the exact day and time of SOL, pre-labour Caesarean section, or onset of labour following induction. A Kaplan-Meier curve was created to estimate the probability of SOL. A Cox regression model was used to assess the independent influence of maternal age, parity, BMI, and pregnancy weight gain on the SOL, and to assess the extent to which prediction of SOL could be individualized according to a woman's characteristics.

Results: Among 15 253 women undelivered at 41+0 weeks, there was a 67.6% (95% CI 66.4% to 68.7%) chance of SOL by 41+6 weeks. Although SOL was statistically more likely in younger women, higher parity, lower BMI, and lower weight gain ($P < 0.01$), the multivariable model's predictive ability was poor (c -statistic 0.56).

Conclusion: Maternal characteristics were not a strong determinant for successful individualized prediction of SOL in women with uncomplicated pregnancies reaching 41+0 weeks of gestation. Our population-based estimates of the daily occurrence of SOL can be used to inform discussions with women on when to offer induction of labour.

Key Words: Spontaneous onset of labour, prolonged pregnancy, post-date pregnancy

Competing Interests: None declared

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Résumé

Objectif : Estimer la probabilité du travail d'apparition spontanée (TAS) chez les femmes qui connaissent une grossesse exempte de complications atteignant 41+0 semaines et examiner l'influence des caractéristiques maternelles sur cet événement.

Méthodes : Nous avons mené une étude de cohorte rétrospective en population générale qui portait sur les femmes connaissant une grossesse monofœtale exempte de complications en présentation céphalique entre 41+0 et 42+0 semaines de gestation. Nous avons tiré des renseignements cliniques détaillés du *British Columbia Perinatal Data Registry*. Nous avons déterminé le délai entre 41+0 semaines de gestation et la date et l'heure exactes du TAS, de la tenue d'une césarienne prétravail ou de l'apparition du travail à la suite d'un déclenchement. Une courbe Kaplan-Meier a été tracée pour estimer la probabilité du TAS. Un modèle de régression de Cox a été utilisé pour évaluer l'influence indépendante de l'âge maternel, de la parité, de l'IMC et du gain pondéral pendant la grossesse sur le TAS, ainsi que pour évaluer la mesure dans laquelle la prévision du TAS pourrait être personnalisée en fonction des caractéristiques de la patiente.

Résultats : Chez 15 253 femmes n'ayant toujours pas accouché à 41+0 semaines, la probabilité de voir se manifester un TAS d'ici à 41+6 semaines était de 67,6 % (IC à 95 %, 66,4 % - 68,7 %). Bien que le TAS ait été plus probable sur le plan statistique chez les femmes présentant un âge moindre, une parité accrue, un IMC moindre et un gain pondéral moindre ($P < 0,01$), la valeur de prévision du modèle multivarié était faible (c -statistic : 0,56).

Conclusion : Les caractéristiques maternelles ne constituaient pas un déterminant solide aux fins de la réussite de la prévision personnalisée du TAS chez les femmes qui connaissaient une grossesse exempte de complications atteignant 41+0 semaines de gestation. Nos estimations en population générale quant à la manifestation quotidienne du TAS peuvent être utilisées pour éclairer les discussions menées avec les femmes quant à la détermination du moment propice à l'offre d'un déclenchement du travail.

INTRODUCTION

In the past 20 years, the management of pregnancies beyond 41+0 weeks of gestation (“post-dates”) has favoured induction of labour.^{1,2} Dating of pregnancy using first trimester ultrasound and membrane sweeping at the end of pregnancy have reduced the number of women reaching 41+0 weeks of gestation without delivering,^{3–8} but “post-dates” remains the most frequent indication for induction of labour. This practice is supported by high-quality, randomized trial evidence: a recent meta-analysis of 10 randomized or quasi-randomized trials reported a significant reduction in perinatal mortality in a group of patients in whom labour induction was offered at 41 weeks of gestation compared with those in an expectant management group.² In this same meta-analysis, this result was achieved without any increase in the risk of delivery by Caesarean section. In the original large multicentre trial conducted by Hannah et al.,¹ induction of labour in post-term women was associated with a decrease in Caesarean section rates. In a systematic review of elective induction of labour versus expectant management of pregnancy, Caughey et al. also showed that there is a significant decrease in Caesarean section rates associated with induction of labour in this setting.⁹

Although in these recent analyses there are significant differences in perinatal mortality and morbidity between the induction and expectant management groups, the differences in absolute numbers remain small. As a result, the number needed to treat for benefit associated with labour induction for post-dates is high: it has been estimated that nearly 500 women need to have labour induced to prevent a single perinatal death.¹⁰ Many women view the spontaneous onset of labour as a positive experience and prefer to avoid intervention; according to Heimstad et al.,¹¹ one in four women would prefer not to undergo induction of labour when they reach 41+0 weeks. Induction at or beyond 41+0 weeks is viewed by women as a loss of the natural delivery process.¹² Labour that is induced does result in satisfaction rates lower than those in women who undergo spontaneous labour.¹³ Therefore it is important for women to understand their likelihood of spontaneous onset of labour in the seven days after they reach 41+0 weeks. Women and their care providers must therefore weigh the low but serious risk of stillbirth against the desire to avoid medical intervention in the onset of labour. Knowing the probability that a woman who remains pregnant at 41+0 weeks will go into labour spontaneously over the course of the following days is critical for informing care plan decisions. Although there is knowledge regarding the risk factors for reaching 41+0 weeks of gestation, once this milestone has been reached

there is scarce high-quality evidence on the day-specific probability of spontaneous labour during the following week in a population with ultrasound-confirmed estimates of gestational age.

The goals of this study were firstly to calculate the daily probability of spontaneous onset of labour between 41+0 weeks and 42+0 weeks of gestation, and secondly to determine the extent to which the prediction of spontaneous onset of labour can be individualized using maternal characteristics.

METHODS

We reviewed data from women with uncomplicated singleton pregnancies in cephalic presentation with ultrasound confirmed dating who delivered at or beyond 41+0 weeks of gestation in British Columbia between January 2008 and December 2012. We excluded women with comorbidities of maternal diabetes, hypertension, heart disease, or renal disease. We also excluded women whose newborns had congenital anomalies. Women with a previous Caesarean section were not excluded. All data were extracted from the British Columbia Perinatal Data Registry from Perinatal Services British Columbia. The British Columbia Perinatal Data Registry is a quality controlled database containing abstracted medical chart information from over 99% of births in British Columbia.

Women were followed from 41+0 weeks until the day and time (in hours and minutes) of either the spontaneous onset of labour, onset of labour following induction, or delivery by pre-labour Caesarean section. After the occurrence of one of these three events, women were no longer considered “at risk” of spontaneous labour and were removed from the denominator calculation (censored).

A Kaplan-Meier curve was created to estimate the probability of spontaneous onset of labour. This curve was based on a continuous measure of time (time since 41+0 weeks in minutes), calculating the probability of labour at a given moment as a fraction of all pregnancies that remained ongoing at that time. For ease of interpretation, these results were also expressed as day-specific probabilities of spontaneous labour. Kaplan-Meier curves stratified by maternal characteristics were also created, with log-rank tests used to test for statistically significant differences between groups.

Maternal characteristics examined were maternal age (years), parity (nulliparous or para ≥ 1), pre-pregnancy BMI (groups of ≤ 18.4 , 18.5 to 24.9, 25 to 29.9, and ≥ 30 kg/m²). Finally, gestational weight gain was

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