

Does Routine Induction of Labour at 41 Weeks Really Reduce the Rate of Caesarean Section Compared With Expectant Management?

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Abstract

Objective: It is contended that routine induction of labour at 41 completed weeks of gestation reduces, or at least does not increase, a woman's chance of Caesarean section (CS), compared with expectant management. We wanted to know if this was true in our own hospital.

Methods: We performed a retrospective review of 1367 nulliparous women who had reached 41+0 weeks undelivered with a live, singleton, fetus with a cephalic presentation. The women comprised two non-randomized contemporaneous cohorts: in one group, expectant management was planned, and in the second group the intention was to induce labour at 41 weeks. The primary outcome measure was the rate of CS in each group.

Results: Of 645 women in whom expectant management was planned, 17.7% delivered by CS. Of 722 women in whom induction of labour was planned, 21.3% delivered by CS ($P = 0.09$). Of the total of 907 women in whom expectant management was planned or who laboured spontaneously before planned induction could be carried out, 16.6% delivered by CS. Of 460 women in whom induction was planned and actually carried out, 25.4% delivered by CS ($P = 0.001$).

Conclusion: The contention that routine induction of labour at 41 weeks reduces a woman's chance of delivery by Caesarean section was not supported by the findings of our study. Inducing labour may actually increase the nulliparous woman's risk of delivery by CS.

Résumé

Objectif : Certains affirment que le déclenchement systématique du travail après 41 semaines complètes de gestation atténue le risque (ou, à tout le moins, n'en entraîne pas la hausse) de devoir procéder à une césarienne (CS), par comparaison avec la prise en charge non interventionniste. Nous souhaitons savoir si cela était vrai au sein de notre hôpital.

Méthodes : Nous avons mené une analyse rétrospective portant sur 1 367 nullipares qui avaient atteint 41+0 semaines de gestation, sans accoucher, dans le cadre d'une grossesse monofœtale

vivante en présentation céphalique. Les femmes étaient réparties en deux cohortes contemporaines non randomisées : dans le premier groupe, une prise en charge non interventionniste était planifiée; dans le deuxième groupe, l'intention était de déclencher le travail à la 41^e semaine. Le critère d'évaluation primaire était le taux de CS dans chacun des groupes.

Résultats : Chez les 645 femmes pour lesquelles une prise en charge non interventionniste était planifiée, 17,7 % ont accouché par CS. Chez les 722 femmes pour lesquelles un déclenchement du travail était planifié, 21,3 % ont accouché par CS ($P = 0,09$). Chez les 907 femmes au total pour lesquelles une prise en charge non interventionniste était planifiée ou dont le travail a débuté de façon spontanée avant l'exécution du déclenchement planifié, 16,6 % ont accouché par CS. Chez les 460 femmes pour lesquelles un déclenchement du travail était planifié et a réellement eu lieu, 25,4 % ont accouché par CS ($P = 0,001$).

Conclusion : L'affirmation selon laquelle le déclenchement systématique du travail après 41 semaines complètes de gestation atténue le risque de devoir procéder à une césarienne n'a pas été soutenue par les résultats de notre étude. En fait, le déclenchement du travail pourrait accroître le risque d'accouchement par césarienne chez les nullipares.

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INTRODUCTION

Traditionally, pregnancy was considered post-term at or beyond 42 weeks (294 days) of gestation. At this gestation, if the cervix was unfavourable, debate over best practice was between routine induction of labour and expectant management with some form of serial fetal monitoring. In 1992, a large Canadian multicentre randomized controlled trial (hereafter referred to as the Canadian Post-term Trial) compared induction of labour at 41 weeks (287 to 293 days) with serial fetal monitoring.¹ The conclusions of the Canadian Post-term Trial were that (1) routine induction of labour at 41 weeks possibly reduced perinatal mortality (0/1701 in the induced group vs. 2/1706 in the expectant group), and (2) induction of labour also reduced the woman's risk of Caesarean section (21.2% in the induction group vs. 24.5% in the expectant group; 28.5% vs. 33.0% in

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nulliparous women²). Primarily on the basis of this study, the Society of Obstetricians and Gynaecologists of Canada (SOGC) issued a clinical practice guideline in 1997³ recommending that, at 41 completed weeks of gestation, women should be offered elective delivery, with cervix ripening if the cervix is unfavourable. In 2008, the clinical practice guideline was updated, but the recommendation was similar: "Women should be offered induction at 41+0 to 42+0 weeks, as the present evidence reveals a decrease in perinatal mortality without increased risk of Caesarean section."⁴ Although proportions of pregnancies undelivered by 41+0 weeks versus 42+0 weeks vary between populations, depending in part on the use of ultrasound dating, about 15% to 20% of women will have induction of labour with a policy of routine induction at 41+0 weeks, as opposed to about 3% to 5% at 42+0 weeks.⁵⁻⁷ This policy is designed to prevent a 1 in 1000 chance of fetal death between 41+0 weeks and 42+0 weeks.⁸⁻¹⁴ Prior to the Canadian Post-term Trial, such an intervention applied to such a large proportion of the obstetrical and fetal population was eschewed lest the woman's risk of Caesarean section (CS) be increased. However, the results of the Canadian Post-term Trial and a subsequent meta-analysis¹⁵ (to which the Canadian Post-term Trial contributed 59% of cases at or beyond 41 completed weeks) suggest a lower risk of CS associated with induction at 41+0 weeks.

At our hospital, notwithstanding the SOGC clinical practice guidelines, there is disagreement among obstetricians about whether to induce labour at 41 weeks or whether to institute fetal monitoring and induce at 42 weeks. This study was conducted to answer the following question: Does a policy of routine induction of labour at 41 weeks increase or decrease a nulliparous woman's chance of Caesarean section compared with a policy of deferring induction until there is abnormal fetal testing or 42+0 weeks is reached?

MATERIALS AND METHODS

We performed a retrospective review of two non-randomized contemporaneous cohorts of nulliparous women who had reached 41+0 weeks' gestation with a live singleton pregnancy with a cephalic presentation, and whose planned management was to be either induction of labour at 41 weeks or expectant management with serial fetal monitoring beginning at 41 weeks. The serial fetal monitoring comprised biophysical profile scoring performed every three or four days.

We analyzed data from deliveries that took place over a three-year period, from January 2005 to December 2007, at Women's Hospital in Winnipeg, Manitoba. This hospital is one of the two obstetrics and gynaecology teaching

hospitals for the University of Manitoba. It is one of the two centres providing tertiary level obstetrical care for the province of Manitoba, and also provides obstetrical care for much of the city of Winnipeg. During the three-year period there were approximately 5000 deliveries per year at the hospital.

Nulliparous women who had a singleton delivery with a cephalic presentation at or beyond 41+0 weeks were identified from the delivery log books. For each woman we then determined whether the planned management had been to await spontaneous labour or to induce labour for postdates (41+0 to 41+6 weeks). This determination was possible because every proposed induction had to have a request form filled in, and copies of these forms were stored with the delivery log books. When necessary, patients' charts were obtained from the medical records department and reviewed. Women who had been transferred during labour from other hospitals or from home were excluded from this analysis.

From the data, it was possible to determine (1) whether expectant management (Group I) or induction of labour (Group II) was planned, and (2) whether delivery was vaginal or by Caesarean section. However, based on the reality of unpredictable management plans, the two groups were broken down into subgroups. The expectant management group was subdivided into three subgroups:

- Group IA: no plan to induce, and labour began spontaneously
- Group IB: no plan to induce, but labour induced because of abnormal fetal testing or obstetrical complications
- Group IC: no plan to induce at 41 weeks, but induced at 42 weeks.

The induction group was divided into two subgroups:

- Group IIA: plan to induce, but spontaneous labour ensued before induction could be carried out
- Group IIB: induction planned, and induction carried out.

Women requiring induction of labour because of spontaneous rupture of membranes were considered to have declared themselves ready for labour and thus were assigned to either Group IA or Group IIA, depending on the original management intent.

The main outcome measure was the rate of Caesarean section in each group. However, since concern for fetal or neonatal death is the main impetus for routine induction at 41 weeks, we identified all perinatal deaths occurring at or after 41+0 weeks. Given that the perinatal death rate at 41 weeks is about 1 in 1000,⁸⁻¹⁴ the study was very unlikely to detect a statistically significant difference in perinatal outcome.

Caesarean section rates in nulliparous women at 41+0 weeks according to intended management

	Women n	Caesarean sections n	Caesarean sections %
Total Postdates	1367	268	19.6
Planned Expectant (Group I)	645	114	17.7
Spontaneous labour (IA)	563	94	16.7
Induced for abnormal testing	21	4	19.0
Induced, 42 weeks	61	16	26.2
Planned Induction (Group II)	722	154	21.3
Spontaneous labour (IIA)	262	37	14.1
Induced (IIB)	460	117	25.4
Group I and Group IIA	907	151	16.6
Group IIB	460	117	25.4

↑
P = 0.09
↓

↓
P = 0.001
↑

We used the chi-squared test, applied to the two 2×2 tables of the Table, for statistical analysis.

Ethics approval for the study was given by the Health Research Board, University of Manitoba, Bannatyne Campus.

RESULTS

Over the three-year period, there were 1367 nulliparous women who reached 41+0 weeks undelivered with a live singleton fetus with a cephalic presentation. The overall rate of CS in these women was 19.6%.

Of the 645 women in whom expectant management was planned, 87% went into spontaneous labour, 3% had labour induced because of abnormal fetal testing or changed obstetrical status, and 9% had labour induced because they had reached 42+0 weeks of gestation. The overall CS rate for the expectant group (Group I) was 17.7%.

Of the 722 women in whom induction of labour was planned, 36% went into spontaneous labour before induction could be carried out. The remainder (64%) underwent induction as planned. The CS rate for the planned induction group (Group II) was 21.3%.

Of the total 1367 women, 907 were either in the planned expectant group (Group I, $n = 645$) or were in the planned induction group and went into spontaneous labour before induction of labour (Group IIA, $n = 262$). The CS rate in this combined spontaneous labour group (Group I and Group IIA) was 16.6%. Of the total 1367 women, 460 were scheduled to have induction of labour solely for postdates and actually underwent induction. The CS rate in this non-spontaneous labour group (Group IIB) was 25.4%.

There were two perinatal deaths, both in the expectant group (Group I). The first death was in a 23-year-old nulliparous woman who had been on insulin therapy for gestational diabetes since 36 weeks. She presented at 41+0 weeks in early labour. Fetal death was confirmed and she delivered a stillborn 4030 g baby. Inexplicably, no fetal monitoring had been carried out, and the pregnancy had been allowed to continue to 41 weeks. We include this death in the expectant group, although such a patient was not low risk and her pregnancy should not have reached 41 weeks. The second perinatal death occurred in a 34-year-old nulliparous woman. At 41+0 weeks she had a normal biophysical profile. Thirty-six hours later she presented in labour. Initial fetal monitoring showed a baseline fetal heart rate of 150 bpm with no acceleration and minimal variability over 20 minutes. After monitoring was discontinued for the patient to go to the bathroom, the membranes ruptured and thick meconium was identified in the amniotic fluid. When monitoring was resumed after 10 to 15 minutes, no fetal heart tones were present. A stillborn baby weighing 3555 g was subsequently delivered.

DISCUSSION

Two reasons are advanced to justify routine induction of labour at 41 weeks' gestation. One reason is to save the fetus from death in utero. The risk of a fetus dying in utero, without any monitoring, between 41 weeks and 42 weeks is 1 per 1000.⁸⁻¹⁴ About 15-20% of women are undelivered at 41+0 weeks.⁵⁻⁷ Some 1000 inductions have to be done to possibly prevent one fetus from dying in utero between 41 weeks and 42 weeks. Such an intervention applied to such a large proportion of the obstetric and fetal population for such little benefit had been the reason that, until publication of the Canadian Post-term Trial¹ and the SOGC 1997

clinical practice guidelines,³ routine induction of labour was not considered until 42+0 weeks. At 42 weeks, only about 3% to 5% of women are undelivered, and the risk of fetal death in the subsequent week is 2 to 4 per 1000.¹⁴

The second reason advanced to justify routine induction of labour at 41 weeks is the finding in the Canadian Post-term Trial¹ (and in the subsequent meta-analysis,¹⁵ to which the Canadian Post-term Trial contributed 59% of the cases) of a lower rate of CS if labour is induced compared with expectant management. This finding is surprising, given the considerable and consistent evidence that induction before 41+0 weeks, especially in nulliparous women with an unfavourable cervix, markedly increases the rate of CS.^{16–25} Indeed, if inducing labour at 41 weeks occasionally saves a fetus's life and also reduces a woman's chance of CS, then the case for routine induction of labour at 41 weeks would not only be tenable but would be compelling.

Our study examined the outcomes in nulliparous women who had reached 41+0 weeks undelivered with a live singleton fetus with a cephalic presentation. Our results were quite different from those of the Canadian Post-term Trial, which reported a 28.5% CS rate in nulliparous women in the induction group versus a 33% CS rate in the expectant group.² In our study, the rate of CS in women in whom induction of labour was planned (21.3%) was higher than in the planned expectant group (17.7%), but not significantly so ($P = 0.09$). However, the rate of CS in the planned induction group who actually had induction (25.4%) was significantly higher than the rate in the combined expectant group (whether induced or not) together with the women from the planned induction group who laboured spontaneously (16.6%) ($P = 0.001$).

How can we account for these different findings? There are two likely explanations. The first of these is the possibility that our findings are not generalizable to other Canadian tertiary obstetric units. The obstetrical practices in the late 1980s and early 1990s in Toronto (where most patients in the Canadian Post-term Trial were recruited) appear to have been quite different from those in Winnipeg in 2005–2007. The overall rate of CS among nulliparous women in the Canadian Post-term Trial was 30.8%; in our study it was 19.6%. The CS rate in our tertiary hospital from 2005 to 2007, for nulliparous women at term with a singleton fetus with a cephalic presentation, was 14%, whereas elsewhere in Canada the CS rate for such women is about 25%.^{26,27} Furthermore, presumed fetal compromise as an indication for induction of labour or CS was recorded in only 3% of postdates nulliparas managed expectantly in our hospital; we are not aware of comparable current figures from elsewhere in Canada, but in the Canadian Post-term Trial 17% of women in the expectant monitoring group had abnormal

fetal testing and had labour induced for that reason. Therefore, because of this difference in the care provided in our hospital, our results may not be applicable to most Canadian tertiary obstetric units.

The second possible explanation is that the Canadian Post-term Trial was a randomized controlled trial, whereas our study was a non-randomized contemporaneous cohort trial. An evident weakness of our study is that we cannot provide a demographic comparison of the two cohorts with respect to potentially important differences between them (such as age, ethnicity, body mass index, Bishop score, and presence of medical conditions). Thus, there are potential allocation biases that might explain our different results. One such potential bias would occur if there were more medical problems (such as diabetes or hypertension) in the women in our study who were scheduled for induction of labour than in those allocated to expectant management. This was not examined, but we feel it is quite unlikely because rarely will an obstetrician allow a woman with a medical problem that might endanger her or her fetus to reach 41+0 weeks' gestation undelivered. Indeed, one of our two perinatal deaths occurred in just such a patient whose care was clearly suboptimal.

A second indeterminable bias could occur if women who did not want intervention by induction of labour at 41 weeks were also less likely to accept intervention such as CS during labour for slow progress or possible fetal compromise.

A third bias could occur if obstetricians who were less interventionist and preferred an expectant approach at 41 weeks were also less likely to perform CS during labour. This is unlikely to have affected our results. All but two of the 20 obstetricians who conducted deliveries during the study period were in one of two call groups, in which the obstetrician on call managed all the labouring women of his or her call group who were induced or came in during his or her 24-hour call. The less interventionist obstetricians were required to provide care for their colleagues' patients who had had labour induced; similarly, the more interventionist obstetricians were required to provide care for their colleagues' postdates patients who had begun labouring spontaneously.

A fourth, also indeterminable, bias could occur if women were more likely to be in the induction group if the cervix was favourable and more likely to be in the expectant group if the cervix was unfavourable. This would have made the results with respect to CS more favourable in the induction group.

A possible allocation bias might occur if obstetricians who did not accept the findings of the Canadian Post-term Trial (that induction of labour lowers CS rates) were more likely

to assign young nullipara to expectant management, because young nullipara have lower rates of CS than older nullipara.²⁸ Conversely, those same obstetricians might have been reluctant to induce labour in obese nullipara, to avoid further increasing the risk of CS because obese women are more likely to undergo CS than non-obese women.^{29,30}

These potential biases in allocation in our study cannot be denied. It has been stated that “the RCT is the most reliable form of scientific evidence, as it is the best known design for eliminating biases that can compromise the validity of research.”⁴ This statement is true, however, only for biases in allocation. There are many other biases that are not eliminated by randomization³¹ and this was the case in the Canadian Post-term Trial.

One bias in the Canadian Post-term Trial (acknowledged by the authors) that might have accounted for part of the induction cohort’s lower rate of CS was that use of prostaglandin gel for cervical ripening was permitted only in the induction arm, but was forbidden in the expectant cohort, one third of whom had labour induced.

Another potential bias was the premise of the Canadian Post-term Trial and all other randomized controlled trials addressing the question of induction of labour at 41 weeks. Women were asked to participate in a study in which they were effectively told: “We do not know if it is safe for your baby to let your pregnancy continue beyond 41 weeks, or if it is better to induce labour.” It is possible that as the duration of pregnancy extended, the women in the expectant group would have felt increasing concern for their baby’s health and the obstetricians increasing pressure to intervene, possibly with CS, in this designated high risk situation. Interestingly, 17% of women in the expectant monitoring group in the Canadian Post-term Trial underwent induction of labour solely because they no longer wanted expectant management.

A further potential bias was that a different 17% of women in the expectant monitoring group in the Canadian Post-term Trial had labour induced because of suspected fetal compromise (vs. 3% in our study). It is possible that a woman who was randomized to the expectant, supposedly high-risk, group, whose obstetrician learned that testing has revealed fetal compromise, would be more likely to undergo CS for benign intrapartum fetal heart rate changes or the passage of meconium.

In fact, what vitiates the Canadian Post-term Trial is that in the intended induction group, 31% of women did not have labour induced, and in the expectant cohort, 34% of women had labour induced. In essence, one third of each cohort was managed in the manner that was opposite to what had been intended. Because true fetal compromise

between 41+0 weeks and 42+0 weeks of gestation is rare—a 1 in 1000 chance of fetal death, without monitoring^{8–14}—the Canadian Post-term Trial was actually comparing elective induction versus expectant management at 41 weeks. When the results of the Canadian Post-term Trial are analyzed not by intention to treat but by actual treatment received, there is a strikingly higher rate of CS when labour was induced; the exact numbers are not available but one estimate is that the rate of CS was almost doubled (29% vs. 16%).³²

Our study contradicts the claim of the Canadian Post-term Trial that routine induction of labour at 41 weeks lowers a nulliparous woman’s chance of undergoing CS compared with expectant management. In our study, we found a 25% chance of CS if induction was planned and carried out at 41 weeks. There was a 16% chance of CS if there was no original intention to induce labour or if the woman managed to go into spontaneous labour before a planned induction could be carried out.

Although the Canadian Post-term Trial was a randomized controlled trial, the results were corrected for allocation bias but not for other biases. The injunction for routine induction of labour at 41 weeks’ gestation may be quite valid for many, or most, Canadian tertiary obstetric units. For units like ours, with relatively low CS rates and highly restrictive indications for induction, the results of the Canadian Post-term Trial may not be valid.

CONCLUSION

There may be a case for routine induction of labour at 41+0 weeks if the aim is to eliminate the 1 in 1000 chance of fetal death. The best antenatal fetal monitoring cannot prevent deaths from massive abruption or intrapartum asphyxia. But almost 1000 inductions of labour at 41+0 weeks will be needed to prevent a single fetal death. Our study suggests that the contention that routine induction of labour at 41+0 weeks reduces a woman’s chance of CS is untrue, and that the opposite may be true: that inducing labour actually may increase the nulliparous woman’s chance of undergoing Caesarean section.

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