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Earlier induction of labour in post term pregnancies—A historical cohort study



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ABSTRACT

Objective: to evaluate a change of guideline for earlier induction of labour in post term pregnancies and its possible impact on selected birth interventions and outcome of the newborn.

Design: a historical cohort study.

Settings: Department of Obstetrics at Aarhus University Hospital in Denmark.

Participants: 18,247 women giving birth between 1 January 2009 and 12 December 2012.

Methods: to compare induction of labour in two consecutive time periods before and after implementation of a new guideline on induction of labour (42 weeks versus 41 weeks plus five days gestational age) in post term pregnancy. *t*-Test and χ^2 were used to calculate means of gestational age and relative risk (RR) of selected birth and newborn outcomes. Stratification by Mantel–Haenszel-analysis was used to adjust for possible confounders. Robson's classification system 'Ten Group Classification System' was used to create comparable groups within the performed analysis.

Findings: a difference in means of three gestational days after implementation of the new guideline on earlier induction of labour was found together with an overall unadjusted decrease in emergency caesarean section rate of 30% (RR 0.70, 95% CI; 0.54–0.91). Stratified analysis on parity showed a reduction in emergency caesarean section but only in nulliparous women (RR 0.78, 95% CI; 0.66–0.92), whereas the analysis in multiparous women showed a non-statistically significant increased risk of emergency caesarean section (RR 1.39, 95% CI; 0.89–2.18). No differences were found in assisted vaginal childbirths and outcome in newborns concerning Apgar score, pH and standard base excess in women induced in 42 weeks versus 41 weeks plus five days gestational age.

Conclusion: the findings of this study suggest that earlier induction of labour due to post term pregnancy has a positive influence, but only in nulliparous women, by lowering the risk of emergency caesarean section evidently without increasing the risk on adverse outcome in newborns.

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Introduction

The incidence of induced labour has increased over the last decade (Humphrey and Tucker, 2009; Walker et al., 2014). In 2002 14.3% of all births in Denmark were induced whereas the incidence of induced labours in 2012 was 25.6% (Statens Serums Institut, 2014). Post term pregnancy is a frequent medical indication for induction of labour as post term pregnancy is associated with an increased risk of fetal and maternal complications

(Humphrey and Tucker, 2009). Adverse fetal outcomes include asphyxia, meconium aspiration and placenta insufficiency whereas perinatal mortality is a rare complication (Eden et al., 1987; Olesen et al., 2003; DSOG, 2011). Maternal complications include post partum haemorrhage, labour dysfunction and emergency caesarean section (Campbell et al., 1997; Olesen et al., 2003; Caughey et al., 2007). The effects of earlier induction of labour are discussed in general (Gulmezoglu et al., 2006; Galal et al., 2012) and a number of studies have found that induction of labour led to an increased risk of caesarean section (Luthy et al., 2004; McCarthy et al., 2007; Roos et al., 2010). However, a meta-analysis from 2012 found that earlier induction of labour in post term pregnancy reduced the risk of caesarean section by 11%. Further, the meta-analysis showed that induction of labour at gestational age 41

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weeks to 42 weeks led to a decrease in number of newborns with meconium aspiration and perinatal mortality (Gulmezoglu et al., 2012).

In 2011, the Danish Society of Obstetrics and Gynaecology (DSOG) published a new guideline for induction of labour in post term pregnancies inspired by the findings represented in an earlier version of the meta-analysis 'Induction of labour for improving birth outcomes for women at or beyond term' from 2006 (Gulmezoglu et al., 2006). The aim of the new Danish guideline was to induce labour in post term pregnancies at 41 weeks plus five days gestational week to ensure that the pregnancy was terminated before or around week 42 in order to reduce complications related to post term pregnancy.

The revised guideline from the DSOG was implemented at the maternity ward at Aarhus University Hospital 1 June 2011. With this new guideline women with a post term pregnancy are generally offered induction of labour at gestational age 41 weeks plus five days, whereas certain groups with an increased risk of intrauterine death such as women with a Body Mass Index (BMI) above 35, age 40 years or more, or have been through in vitro fertilisation are offered induction at gestational age 41 weeks (DSOG, 2013).

The aim of this study was to evaluate the association between induction of labour in post term pregnancies and emergency caesarean section before and after implementation of a new guideline for post term pregnancies. Secondary to study outcomes as assisted vaginal childbirth and outcome of the newborns.

Methods

Design and study population

This study was designed as a historical cohort study based on data collected prospectively. Data were extracted from 'The Aarhus Birth Cohort (ABC)', which includes information on more than 99% of all childbirths at Aarhus University Hospital. Data on the birth process were registered by the attending midwife and validated by trained midwives before entered into the birth cohort database. Information on maternal weight and height was collected from a questionnaire sent to all pregnant women in the first pregnancy trimester assigned to give birth at Aarhus University Hospital.

All women giving birth between 1 January 2009 and 12 December 2012 at Aarhus University Hospital were included in the study. The study was divided into two consecutive time periods. First study period from 1 January 2009 to 31 May 2011 and, second study period from 1 June 2011 to 12 December 2012.

Exposure and outcome

The exposure in the study was induction of labour in post term pregnancies. In the first study period labour was induced at 42 weeks gestational age. In the second study period labour was induced at 41 weeks plus five days gestational age whereas women with BMI above 35, women aged 40 or more and women with in vitro fertilisation were induced at 41 weeks gestational age. The second study period was considered as the exposure group. The first study period was selected as the reference group in this study.

Induction of labour was defined as one of the following three procedures offered at Aarhus University Hospital; either amniotomy, mechanical induction with the use of a Foleys catheter or use of oral misoprostol. The latter regime was as following: first day, 2 × 50 µg misoprostol with six hours interval. The following days, 2 × 100 µg misoprostol with six hours intervals continuing until successful induction was obtained.

The primary outcome in this study was emergency caesarean section.

Secondary outcomes were assisted vaginal childbirth and newborns with asphyxia. Assisted vaginal delivery was defined as vaginal childbirth by vacuum extractor or forceps. Newborns with asphyxia were defined as Apgar score lower than seven after five minutes or pH value of fetal blood less than 7.10 and Standard Base Excess below – 10 mmol/l.

Statistical analyses

The incidence of induced labour in post term pregnancy was estimated in the two consecutive study periods and an χ^2 -test was used to test the hypothesis of no difference in incidence between the two periods.

A *t*-test was used to compare mean gestational age at time of childbirth to examine if the change of guideline for earlier induction of labour in post term pregnancy resulted in lower gestational age at the time of birth.

In the two consecutive study periods, relative risk was estimated of the incidence of emergency caesarean section, assisted vaginal childbirth and newborns with asphyxia following an earlier induction of labour. The hypothesis of no difference between the two study periods was tested using χ^2 -test and a significance level of $p < 0.05$. All estimates are presented with 95% confidence intervals (CI).

A Mantel-Haenszel-analysis was used to control for confounding in the association between an earlier induction of labour in post term pregnancy and outcomes depended on parity, maternal BMI, maternal age and if the woman had been through in vitro fertilisation.

Robson's 'Ten Group Classification System' was used to stratify data into comparable groups on parity. Data on all induced labours regardless of indication were included in the two Robson groups. Robson group 2A (induced nulliparous, single cephalic, gestational age ≥ 37 weeks) and Robson group 4A (induced multiparous, excluding previous caesarean section, single cephalic, gestational age ≥ 30 weeks).

Data management and statistical analysis were performed using Stata Statistical Software, version 13.0 (STATA-Corp. College Station, TX, USA, 2013).

Ethical considerations

This study used anonymous secondary data. All data were stored according to the Act on Processing of Personal Data and the study was approved by the Danish Data Protection Agency (Journal number 2008-41-2351) (Danish Data Protection Agency, 2014).

Findings

A total of 18,247 women were included in this historical cohort and 4129 of these women underwent induced labour. Of the 4129 women with induced labours 1104 women were induced on the medical indication post term pregnancy.

A total of 11,286 women were included in the first period and 6961 in the second period. Basic characteristics of the study population were similar for the two study periods with the exception of previous caesarean section, labour start, indication for induction, mode of childbirth and Apgar score at five minutes (Table 1). Information about maternal height and weight was collected from self-reported questionnaires in 63% of the women in the first trimester of pregnancy.

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