OBSTETRICS

Preterm induction of labor: predictors of vaginal delivery and labor curves

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OBJECTIVE: The purpose of this study was to evaluate the labor curves of patients who undergo preterm induction of labor (IOL) and to assess possible predictors of vaginal delivery (VD).

STUDY DESIGN: Data from the National Institute of Child Health and Human Development Consortium on Safe Labor were analyzed. A total of 6555 women who underwent medically indicated IOL at <37 weeks of gestation were included in this analysis. Patients were divided into 4 groups based on gestational age (GA): group A, 24-27+6 weeks; B, 28-30+6 weeks; C, 31-33+6 weeks; and D, 34-36+6 weeks. Pregnant women with a contraindication to VD, IOL ≥37 weeks of gestation, and without data from cervical examination on admission were excluded. Analysis of variance was used to assess differences between GA groups. Multiple logistic regression was used to assess predictors of VD. A repeated measures analysis was used to determine average labor curves.

RESULTS: Rates of vaginal live births increased with GA, from 35% (group A) to 76% (group D). Parous women (odds ratio, 6.78; 95% confidence interval, 6.38—7.21) and those with a favorable cervix at the start of IOL (odds ratio, 2.35; 95% confidence interval, 2.23—2.48) were more likely to deliver vaginally. Analysis of labor curves in nulliparous women showed shorter duration of labor with increasing GA; the active phase of labor was, however, similar across all GAs.

CONCLUSION: Most women who undergo medically indicated preterm IOL between 24 and 36+6 weeks of gestation deliver vaginally. The strongest predictor of VD was parity. Preterm IOL had a limited influence on estimated labor curves across GAs.

Key words: induction of labor, labor curve, preterm

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Approximately 12% of all deliveries in the United States occur at <37 weeks of gestation.[1] Preterm birth is the leading cause of neonatal death and morbidity, contributing to >35% of total infant health care spending, well >5 billion dollars per year.[2,3] Spontaneous labor precedes approximately 50% of preterm deliveries, the remainder are guided by medical necessity because of either maternal or fetal indications.[4] Cervical favorability, as assessed by Bishop scoring, cervical length, and maternal parity predicted vaginal delivery after induction of labor (IOL) at term.[5,6] However, data regarding predictors of vaginal delivery and labor curves in pregnancies that undergo preterm IOL are limited.

Using an interval censored analysis, Zhang et al[7,8] revisited the median progression of labor at term. Active labor occurred most commonly after 6 cm of dilation, and cervical dilation progressed more slowly than previously thought, especially between 4 and 6 cm. These results represent a departure from the Friedman curve[9] and now inform our clinical knowledge of median labor progression in modern obstetric practice. Additionally, inherent differences in the progress of labor have been attributed to specific patient characteristics or

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clinical conditions. Maternal obesity,[10,11] gestational age <37 weeks,[12] and even fetal sex[13] have been shown to influence labor progression. In our study, we examined a large, contemporary US labor database to identify labor curves and predictors of vaginal delivery in pregnant women who underwent medically indicated preterm IOL. We hypothesized that gestational age would influence labor curves in women who undergo preterm IOL.

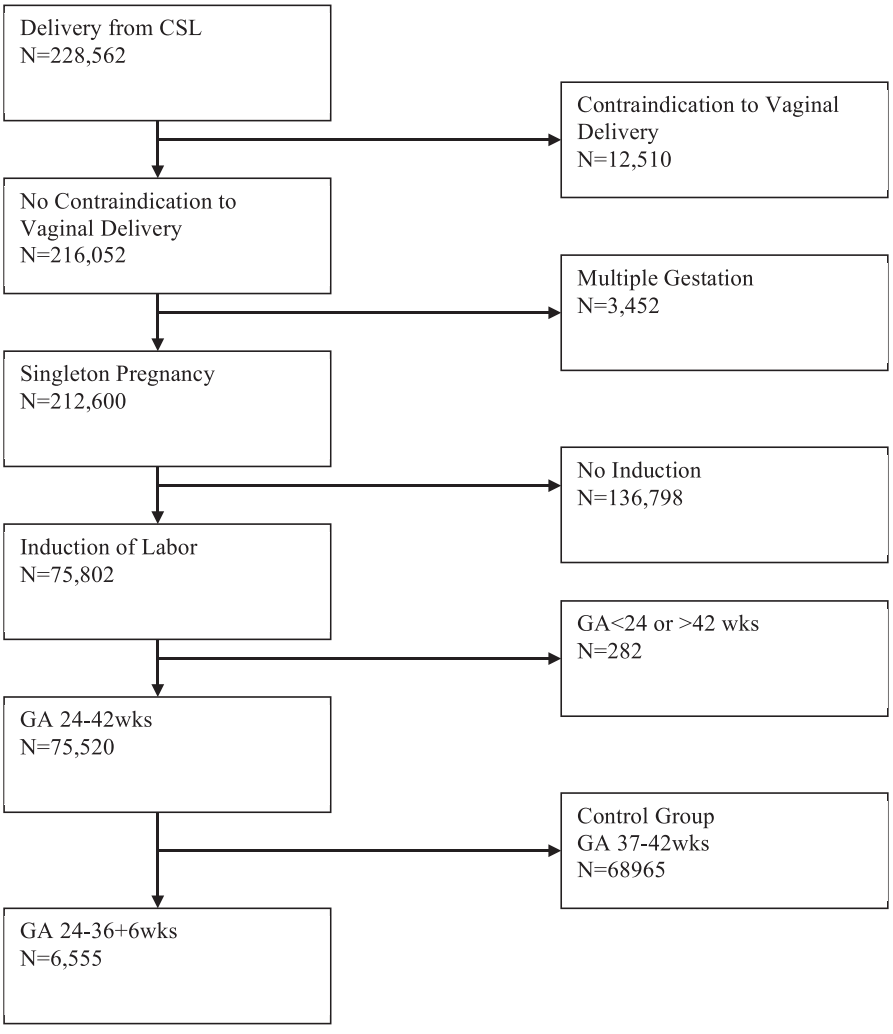
Materials and Methods

This was a retrospective analysis of deidentified data from the Consortium on Safe Labor (CSL). The CSL is a multicenter, retrospective, observational study with detailed labor and delivery information from electronic medical records at 12 clinical centers (which included a total of 19 US hospitals) from 2002-2008; 87% of the deliveries occurred from 2005-2007. Data collected from electronic medical records included demographics, medical history, labor and delivery information, and obstetric, postpartum, and neonatal outcomes. Patient data were supplemented with maternal discharge International Classification of Diseases, ninth revision, codes for each delivery. Each site transferred data in electronic format to the data coordinating center where data were mapped to common categories for each predefined variable. Validation studies indicated that the electronic medical record data represented the medical charts accurately.[14] This analysis was approved by the Institutional Review Board of MedStar Health Research Institute.

The CSL cohort includes information on 233,844 births from 228,562 pregnancies. IOL was a predefined variable when either the patient's electronic medical record indicated that there was an induction or a start time was recorded in the patient's chart. The database included a distinct variable for labor augmentation. The indication for induction was used to identify the precursors of delivery and classified with the use of a previously described hierarchy.[15] One site did not provide indications for induction and was not included in the precursor analysis. Four hospitals did not report methods of induction, and 2 hospitals did not report cervical dilation at admission, which left cases from 13 hospitals available for analysis (Figure 1). Fewer than 20% of the remaining cases had an original Bishop score with all 5 components reported. Therefore, we used the previously described simplified Bishop score comprised of dilation, effacement, and station.[16] We defined an unfavorable cervix as a simplified Bishop score ≤4 because of similar sensitivity and specificity to the original Bishop score ≤6.[17]

After excluding data from women with any contraindication to vaginal delivery (ie, vasa previa, complete placenta previa, breech presentation, previous myomectomy or classical cesarean delivery), multifetal gestation, spontaneous labor, and gestational age (GA) <24 weeks, our cohort included 6555 pregnant women who underwent IOL at 24+0 to 36+6 completed weeks (Figure 1). Outcomes were grouped and analyzed by GA that was determined from the labor and delivery admission records: 24+0 to 27+6 weeks (group A), 28+0 to 30+6 weeks (group B), 31+0

FIGURE 1
Patient selection diagram



Flow diagram for study cohort.

CSL, Consortium on Safe Labor; *GA*, gestational age.

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