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Outcomes of induction vs prelabor cesarean delivery at <33 weeks for hypertensive disorders of pregnancy

Elisa T. Bushman, MD,
The University of Alabama at Birmingham, Birmingham, AL

William A. Grobman, MD, MBA,
Northwestern University, Chicago, IL

Jennifer L. Bailit, MD, MPH,
MetroHealth Medical Center-Case Western Reserve University, Cleveland, OH

Uma M. Reddy, MD, MPH,
Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD

Ronald J. Wapner, MD,
Columbia University, New York, NY

Michael W. Varner, MD,
University of Utah Health Sciences Center, Salt Lake City, UT

John M. Thorp Jr, MD,
The University of North Carolina at Chapel Hill, Chapel Hill, NC

Steve N. Caritis, MD,
University of Pittsburgh, Pittsburgh, PA

Mona Prasad, DO, MPH, MD,
The Ohio State University, Columbus, OH

George R. Saade, MD,
The University of Texas Medical Branch, Galveston, TX

Yoram Sorokin, MD,
Wayne State University, Detroit, MI

Dwight J. Rouse, MD,
Brown University, Providence, RI

Sean C. Blackwell, MD,
The University of Texas Health Science Center at Houston-Children's Memorial Hermann Hospital, Houston, TX

Jorge E. Tolosa, MD, MSCE
Oregon Health & Science University, Portland, OR

Corresponding author: Elisa T. Bushman, MD. Etbushman@gmail.com.

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Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network

Abstract

BACKGROUND: Hypertensive disorders of pregnancy are the leading cause of indicated preterm birth; however, the optimal delivery approach for pregnancies complicated by preterm hypertensive disorders of pregnancy remains uncertain.

OBJECTIVE: This study aimed to compare maternal and neonatal morbidity in patients with hypertensive disorders of pregnancy who either went induction of labor or prelabor cesarean delivery at <33 weeks' gestation. In addition, we aimed to quantify the length of induction of labor and rate of vaginal delivery in those who underwent induction of labor.

STUDY DESIGN: This is a secondary analysis of an observational study which included 115,502 patients in 25 hospitals in the United States from 2008 to 2011. Patients were included in the secondary analysis if they were delivered for pregnancy associated hypertension (gestational hypertension or preeclampsia) between 23^0 and $<33^0$ weeks' gestation; and were excluded for known fetal anomalies, multiple gestation, fetal malpresentation or demise, or a contraindication to labor. Maternal and neonatal adverse composite outcomes were evaluated by intended mode of delivery. Secondary outcomes were duration of labor induction and rate of cesarean delivery in those who underwent labor induction.

RESULTS: A total of 471 patients met inclusion criteria, of whom 271 (58%) underwent induction of labor and 200 (42%) underwent prelabor cesarean delivery. Composite maternal morbidity was 10.2% in the induction group and 21.1% in the cesarean delivery group (unadjusted odds ratio, 0.42 [0.25–0.72]; adjusted odds ratio, 0.44 [0.26–0.76]). Neonatal morbidity in the induction group vs the cesarean delivery was 51.9% and 63.8 %, respectively (unadjusted odds ratio, 0.61 [0.42–0.89]; adjusted odds ratio, 0.71 [0.48–1.06]). The frequency of vaginal delivery in the induction group was 53% (95% confidence interval, 46.8–58.7) and the median duration of labor was 13.9 hours (interquartile range, 8.7–22.2). The frequency of vaginal birth was higher in patients at or beyond 29 weeks (39.9% at 24^0–28^6 weeks, 56.3% at 29^0–$<33^0$ weeks; P=.01).

CONCLUSION: Among patients delivered for hypertensive disorders of pregnancy $<33^0$ weeks, labor induction compared with prelabor cesarean delivery is associated with significantly lower odds of maternal but not neonatal morbidity. More than half of patients induced delivered vaginally, with a median duration of labor induction of 13.9 hours.

Keywords

cesarean delivery; induction; preeclampsia; prematurity

Introduction

Hypertensive disorders of pregnancy are the leading cause of indicated preterm birth and accounts for 25% to 43% of all preterm births.[1–3] The optimal delivery approach for pregnancies complicated by preterm hypertensive disorders of pregnancy remains uncertain, with studies citing a vaginal delivery success rate of 1.8% to 80% following induction of labor (IOL) at <28 weeks for preeclampsia.[4–6] Most patients requiring preterm delivery do

not have favorable cervical exams and as a result, some providers advocate for prelabor cesarean delivery owing to concern for worsening hypertension during labor induction and the potential for increased maternal and perinatal morbidity, particularly in the setting of severe hypertensive disease.[5,7–9] Previous studies have suggested that in the setting of preeclampsia with severe features labor induction is associated with better neonatal morbidity, whereas other studies have shown no difference.[4,5,10] No differences in maternal morbidity have been attributed to the mode of delivery in the setting of preeclampsia, although the numbers are small.[4]

Our objective was to compare maternal and neonatal morbidity in patients with hypertensive disorders of pregnancy (gestational hypertension and preeclampsia) at <33 weeks who underwent an IOL compared with those who underwent prelabor cesarean delivery, and to quantify the duration of labor induction and rate of vaginal delivery. Subanalyses were done to evaluate the characteristics associated with the duration of labor induction and the rate of vaginal delivery. We hypothesized that compared with prelabor cesarean delivery, IOL was associated with a lower neonatal and maternal morbidity.

Materials and Methods

This is a secondary analysis of the Assessment of Perinatal EXcellence [APEX] study involving 25 hospitals in the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Data on demographics, intrapartum events, and pregnancy outcomes were collected by trained certified nurses from 115,502 patients with a live fetus >23 weeks' gestation who delivered during the 24-hour period of randomly selected days between 2008 and 2011. Institutional review board approval for the study and a waiver of informed consent was obtained at all centers. Full details of the primary study have been described previously in the original study publication.[11]

Patients were included in our secondary analysis if they had a singleton vertex pregnancy and with the indication for delivery being hypertensive disorders of pregnancy between 24^0 and $<33^0$ weeks' gestation. Hypertensive disorders of pregnancy were defined as gestational hypertension, preeclampsia, eclampsia, or HELLP (hemolysis, elevated liver enzymes, low platelet count) syndrome because we wanted to evaluate any patients with hypertensive disorders of pregnancy severe enough to require delivery. Definitions of hypertensive disorders of pregnancy were not standardized within the data set but were based on institutional interpretation of the American College of Obstetricians and Gynecologists definitions and recommendations at the time of enrollment.[12] Exclusion criteria included fetal anomalies, spontaneous labor, ≥2 previous cesarean deliveries, or other contraindications to labor such as nonreassuring fetal status, placenta previa, placenta accreta, maternal health concern, or previous cesarean delivery with a vertical uterine incision into the contractile portion of the uterus.

The study groups were composed of patients who underwent an IOL or those who underwent a prelabor cesarean delivery. Analysis was done with the intention to treat rather than mode of delivery. The primary outcome was a maternal morbidity composite

of maternal death, hysterectomy, sepsis, venous thromboembolism, intensive care unit (ICU) admission, surgical procedures other than cesarean delivery or postpartum tubal, cerebral vascular event, pulmonary edema, disseminated intravascular coagulation, blood transfusion, blood loss >1500 cc, endometritis, wound infection requiring antibiotics, and wound requiring reoperation.

A neonatal adverse composite outcome was also constructed consisting of neonatal death or intrapartum stillbirth, subgaleal hemorrhage, intraventricular hemorrhage grade 3 or 4, hypoxic ischemic encephalopathy, neonatal enterocolitis, bronchopulmonary dysplasia, confirmed sepsis, hypotension requiring treatment within 30 minutes of birth, intubation or cardiac intervention within the first 30 minutes, respiratory distress syndrome, mechanical ventilation for >7 days, and a 5-minute Apgar score <4.

For covariable adjustment of maternal and neonatal composite outcomes, logistic regression was used to calculate quintile–based propensity scores. This method was used to reduce selection bias, which might occur in patients who underwent prelabor cesarean delivery because their provider felt they were less likely to have a successful vaginal delivery than those who had labor induction recommended. The propensity score was used to construct groups with similar risk profiles. The backward elimination procedure (with 0.05 significance level for variable removal) was used to build a parsimonious model for calculating propensity scores. The covariates that were included initially were gestational age (24^0–28^6 vs 29^0–$<33^0$ weeks), maternal age, maternal race and ethnicity, parity, insurance status, maternal body mass index (BMI) at delivery, smoking during pregnancy, diabetes mellitus, fetal sex (for neonatal outcomes), steroid administration (for neonatal outcomes), small for gestational age (SGA) defined as weight of <10th percentile per methods of Alexander et al,[13] and oligohydramnios defined as an amniotic fluid index of <5 cm or a greatest vertical pocket of <2 cm. After the backward elimination, gestational age, maternal age, insurance status, SGA, and oligohydramnios remained in the model. Further analyses were conducted stratified by gestational age 24^0–28^6 and 29^0–$<33^0$ weeks' gestation, because this has been shown in previous literature to modify the rate of vaginal delivery. The propensity score approach was also used, however the gestational age was not included because it was used for stratification.

Secondary outcomes included a descriptive analysis of the duration of labor induction, which was defined as the duration from the start of cervical ripening or pitocin augmentation to vaginal or cesarean delivery. In patients who underwent IOL, the frequency of successful vaginal delivery was also assessed. Median and interquartile ranges (IQRs) were calculated for the duration of IOL. The proportion of vaginal deliveries after induction and the length of IOL until cesarean or vaginal delivery were analyzed by logistic regression and Cox proportional hazard regression, respectively. For both regression analyses, the covariates that were analyzed were gestational age (29–<33 vs 24–28 weeks), maternal age, maternal race and ethnicity, parity, insurance status, maternal BMI at delivery, smoking during pregnancy, diabetes mellitus, fetal sex, steroid administration, SGA, and oligohydramnios. SAS 9.4 (SAS Institute Inc, Cary, NC) was used for the analyses. All tests were 2-tailed, and $P<.05$ was used to define statistical significance. No imputation for missing data was performed.

Results

Of the 115,502 patients in the parent study, 471 met inclusion criteria for this analysis, of whom 200 (42%) underwent prelabor cesarean delivery and 271 (58%) underwent IOL (Figure). Patients who underwent IOL were less likely to have private insurance, prior cesarean, an SGA fetus, or oligohydramnios, but were younger and more likely to smoke (Table 1). Induction methods included oxytocin and Foley balloon (with or without additional cervical ripening), 69.1%; pharmacologic ripening and oxytocin, 18.1%; Foley balloon alone, 3.9%; and pharmacologic cervical ripening alone 8.8%. All analyses were done with intention to treat rather than delivery outcome to account for morbidity with failed IOL.

The maternal composite outcome occurred in 10.2% of the IOL group vs 21.1% of the prelabor cesarean delivery group. This significantly lower frequency of the maternal composite outcome (unadjusted OR, 0.42; 95% confidence interval [CI], 0.25–0.72) remained significant after the propensity score adjustment (adjusted OR [aOR], 0.44; 95% CI, 0.26–0.76). The most frequent outcomes in the maternal composite were blood transfusions and ICU admissions (Table 2). After using the propensity score, the IOL group had significantly lower odds for ICU admission (3.3% vs 8.5%; aOR, 0.34 (0.15–0.82)). When running this same analysis in only patients who met the criteria for preeclampsia with severe features who underwent IOL vs prelabor cesarean delivery, no significant changes in maternal composite outcomes were found.

Neonatal composite morbidity rates were significantly lower in unadjusted analysis in patients undergoing IOL (51.9% vs 63.8%, unadjusted OR, 0.61; 95% CI, 0.42–0.89). (Table 3). However, after adjustment with the propensity score, the association was no longer significant (aOR, 0.71; 95% CI, 0.48–1.06) (Table 3). When running this analysis in only patients being delivered for preeclampsia with severe features, there was no significant change in neonatal composite outcomes. The most common outcomes in the neonatal composite were respiratory distress syndrome and intubation or cardiac intervention within 30 minutes. After multivariable adjustment, neonates in the IOL group had significantly fewer intubations or cardiac interventions within 30 minutes (17.3% vs 32.5%, aOR, 0.55; 95% CI, 0.35–0.87). There were 2 intrapartum stillbirths in the IOL group, and none in the prelabor cesarean delivery group (Table 2).

Of the 271 patients who underwent IOL, 143 (52.8%) delivered vaginally (Table 4). The primary indications for cesarean delivery following IOL were nonreassuring fetal status (61.7%), dystocia or failed induction (24.2%), and “other” (14.1%). Vaginal delivery rates after labor induction were 39.3% at 24^0–28^6 weeks gestational age and 56.3% at 29^0–<33 weeks’ gestation. Patients who were parous were more likely to have an IOL resulting in vaginal delivery. Patients who were obese, of advanced maternal age, had private insurance, or had an SGA fetus were less likely to achieve a vaginal delivery (Table 5).

The median duration of IOL before a vaginal or cesarean delivery was 13.9 (IQR, 8.7–22.2) hours (Table 4). In patients who were 24^0–28^6 and 29^0–<33^0 weeks’ gestation, the median durations of labor were 15.2 and 13.3 hours, respectively. Maternal BMI at delivery was

associated with a longer IOL, whereas patients who were African American had shorter labors (Table 5).

Discussion

Principal findings

As seen in previous studies, maternal morbidity composite scores were lower in patients with hypertensive disorders of pregnancy who required delivery at <33 weeks and underwent IOL as opposed to those who underwent prelabor cesarean delivery.[9,14] IOL however was not associated with lower neonatal morbidity. Over half of patients who underwent an IOL achieved a vaginal delivery, with a median duration of labor of 13.9 hours. The likelihood of successful vaginal delivery increased with increasing gestational ages, although 39% of patients still delivered vaginally between 24^0 and 28^6 weeks gestation. We also identified factors associated with the success and duration of induction, which included both maternal (previous vaginal delivery, age, insurance status, obesity, and race) and neonatal (SGA) characteristics.

Results

Previous studies have shown a 45% to 67% vaginal delivery rate after IOL in patients with severe preeclampsia, which is consistent with our findings.[5,10,15,16] Our finding of a 39% vaginal delivery rate in early preterm patients at 24^0–28^6 weeks' gestation is also consistent with previous findings.[5,6] Three studies and 1 systematic review that evaluated neonatal outcomes found them to be similar regardless of delivery approach.[4,5,15] The majority of studies that assessed maternal outcomes according to delivery approach in patients with preeclampsia included patients at all gestational ages, whereas our study focused on patients <33 weeks. There is 1 systematic review and 1 retrospective analysis that showed no difference in maternal outcomes associated with mode of delivery.[4] Previous studies also included patients with nonreassuring fetal heart rate tracings before the decision to deliver, even though such patients are not candidates for labor induction.[10,17] Many previous studies have compared mode of delivery, cesarean delivery vs vaginal delivery; instead of the approach to delivery, IOL vs prelabor cesarean delivery. However, there is 1 large retrospective cohort which compared intended mode of delivery in patients <33 weeks' gestation being delivery for preeclampsia which show similar outcomes.[9]

Clinical implications

There is a paucity of data addressing length of labor following induction given the wide variation of labor induction methods and practices. However, we do not feel our IOL time, of 13.9 hours with a range of 8.7 to 22.2 hours, was possibly significantly prolonged despite prematurity, given that in studies by Zhang et al[18] term laboring patients who present at 4 cm have labor times ranging from 4.1 to 17.8 hours. Although IOL in the setting of prematurity is somewhat prolonged, providers should be reassured that the majority (52.8%) will have a successful vaginal delivery following IOL; and patients should be allowed more time in labor, in the setting of hypertensive disorders of pregnancy and IOL, and given maternal benefit without an apparent increase in neonatal complications.

It is unclear why more patients with private insurance underwent prelabor cesarean delivery. This finding could be a result of confounding because more patients with private insurance also had a history of previous cesarean delivery. The increased rate of prelabor cesarean delivery is likely secondary to a history of previous cesarean delivery rather than socioeconomic factors leading patients without private insurance to choose IOL. Further studies need to be conducted evaluating delivery preferences based on insurance status to evaluate this finding more definitively.

Research implications

The majority of patients requiring early preterm delivery for hypertensive disorders of pregnancy who undergo IOL will have a vaginal delivery as well as a significantly lower rate of maternal morbidity regardless of delivery outcome. No difference in neonatal morbidity was seen by intended mode of delivery. These findings should provide useful information in terms of counseling and decision making in patients requiring early preterm delivery for treatment of hypertensive disorders of pregnancy. Given that this is a retrospective study, additional research would be beneficial to more definitively define outcomes.

Strengths and limitations

Our study has several strengths, including the fact that the data used were obtained prospectively by trained chart abstractors, we analyzed a large population of patients with hypertensive disorders of pregnancy requiring early preterm delivery, and we compared maternal and neonatal outcomes–based intention-to-treat (actual clinical management). We used propensity scores to reduce confounding.[6]

Although propensity scoring did reduce the risk of confounding, after propensity score matching our population was diminished, making evaluation of specific, rare maternal and neonatal outcomes not possible, and limiting the ability of this study to assess these important morbidities. We do acknowledge the potential for selection bias and confounding by unknown factors owing to lack of randomization of the interventions and limitation of propensity matching. We acknowledge that women who underwent prelabor cesarean delivery in theory are more likely to have pregnancies complicated by fetal growth restriction, nonreassuring fetal heart tones or other contraindications to IOL. However, we feel that these limitations do not dilute the findings that in pregnancies affected by hypertensive disorders of pregnancy requiring delivery at <33 weeks', without relative contraindications to IOL, the majority of these women undergo successful IOL and therefore the diagnosis of hypertensive disorders of pregnancy at <33 weeks alone should not be a contraindication to IOL. Therefore, these findings should be interpreted as supportive rather than conclusive prompting further studies. Nevertheless, a randomized trial addressing this question does not currently exist and would greatly add to the literature. One confounding factor may be our inability to adjust for severity of disease, however we did try to mitigate this factor by addressing only deliveries at $<33^0$ weeks' gestation because delivery at this gestational age should only be for severe disease. Considering that the data set used in this secondary analysis are now dated, we are unable to account for advancement in neonatal ICU management and changes in clinical definitions or care; however, given that our comparison groups are from the same era, our findings are felt to hold continued

significance. Further studies to evaluate neonatal and maternal outcomes based on Bishop score would be of interest.

Conclusions

Among patients delivered for hypertensive disorders of pregnancy at $<33^0$ weeks, labor induction compared with prelabor cesarean delivery, is associated with significantly lower odds of maternal but not neonatal morbidity. More than half of patients who were induced, delivered vaginally with a median duration of labor induction of 13.9 hours. ■

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AJOG MFM at a Glance

Why was this study conducted?

This study was conducted to identify potential effects of mode of delivery on maternal and neonatal outcomes in women undergoing delivery for hypertensive disorders in pregnancy at <33 weeks.

Key findings

Among patients delivered for hypertensive disorders of pregnancy $<33^0$ weeks, labor induction compared with prelabor cesarean delivery, is associated with significantly lower odds of maternal but not neonatal morbidity. More than half of patients induced delivered vaginally, with a median duration of labor induction of 13.9 hours.

What does this add to what is known?

Our analysis showed that induction of labor for hypertensive disorders in pregnancy at <33 weeks was not associated with lower neonatal morbidity and that over half of patients who underwent an induction of labor achieved a vaginal delivery.

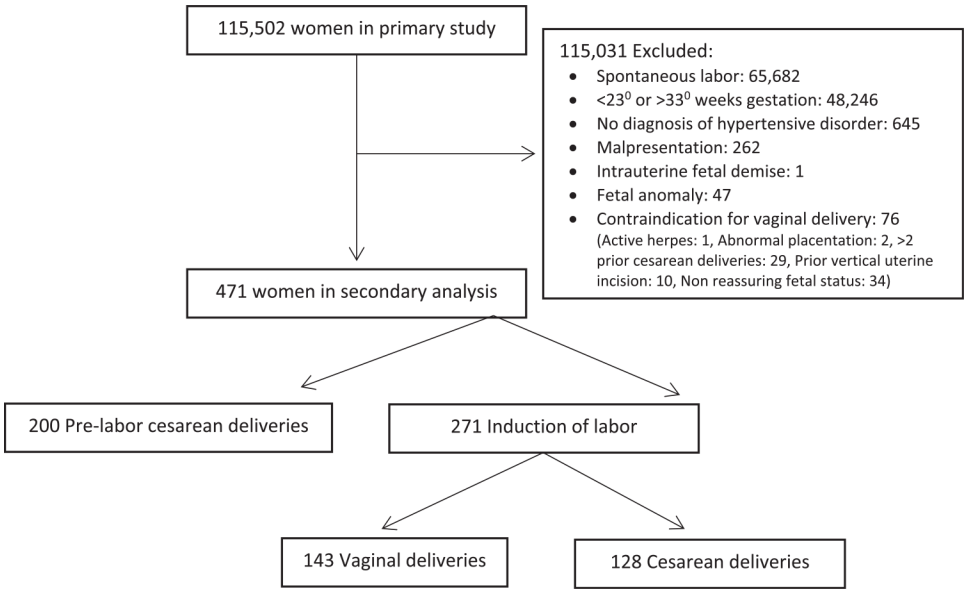

FIGURE. CONSORT flow: Patients delivered at <33 weeks' for hypertensive disorders of pregnancy

CONSORT, Consolidated Standards of Reporting Trials.

Bushman. Outcomes of induction vs prelabor cesarean delivery at <33 weeks for hypertensive disorders of pregnancy. Am J Obstet Gynecol MFM 2023.

TABLE 1

Demographics of patients who underwent induction of labor vs prelabor cesarean delivery for treatment of hypertensive disorders of pregnancy at $<33^0$ weeks' gestation

Characteristics	IOL (N=271)	Prelabor cesarean delivery (N=200)	*P* value
Maternal age	26.0±6.2	27.9±6.2	<.01
Maternal race			
Non-Hispanic White	112 (41.3)	80 (40.0)	
Non-Hispanic Black	103 (38.0)	72 (36.0)	
Hispanic	39 (14.4)	29 (14.5)	
Other	17 (6.3)	19 (9.5)	.63
Nulliparous	165 (60.9)	113 (56.5)	.34
Private insurance	88 (33.1)	102 (51.0)	<.01
Maternal BMI at delivery (kg/m^2)	33.5±8.1	32.7±7.8	.15
Smoking	50 (18.5)	22 (11.0)	.03
Diabetes mellitus	35 (12.9)	22 (11.0)	.53
Previous cesarean delivery	5 (1.9)	53 (26.5)	<.01
Female infant	140 (51.7)	96 (48.0)	.43
Steroid administration	243 (89.7)	183 (91.5)	.50
Small for gestational age	51 (18.8)	53 (26.5)	.04
Oligohydramnios	12 (4.4)	19 (9.5)	.03
Type of PIH			.01
gHTN	5 (1.9)	5 (2.5)	
Pre-E without severe features	11 (4.1)	6 (3.0)	
Uncategorized Pre-E	15 (5.5)	4 (2.0)	
Pre-E with severe features	211 (77.9)	142 (71.0)	
HELLP	26 (9.6)	36 (18.0)	
Eclampsia	3 (1.1)	7 (3.5)	
GA at diagnosis of PIH	29.6±2.5	29.0±2.3	<.01

Data are presented as number (percentage) or mean±standard deviation unless otherwise specified.

BMI, body mass index; *GA*, gestational age; *gHTN*, gestational hypertension, *HELLP*, hemolysis, elevated liver enzymes, low platelet count disorders; *IOL*, induction of labor; *PIH*, pregnancy-induced hypertension; *Pre-E*, preeclampsia.

TABLE 2

Composite components for maternal and neonatal morbidity in patients who underwent delivery for hypertensive disorders of pregnancy at $<33^0$ weeks by induction of labor vs prelabor cesarean delivery

Components	IOL	Cesarean delivery	aOR (95% CI)
Maternal composite components	10.2%	21.1%	0.44 (0.26–0.76)
Maternal death	0	0	NA
Hysterectomy	0	0	NA
Sepsis	0	0	NA
VTE	0	0	NA
ICU admission	9 (3.3)	17 (8.5)	0.34 (0.15–0.82)
Surgery	5 (1.9)	4 (2.0)	NA
Stroke	0	2 (1.0)	NA
Pulmonary edema	10 (3.7)	6 (3.0)	1.38 (0.48–3.98)
DIC	2 (0.7)	1 (0.5)	NA
Blood transfusion	12 (4.4)	19 (9.5)	0.47 (0.21–1.01)
Blood loss >1500 cc	0	5 (2.5)	NA
Endometritis	3 (1.1)	3 (1.5)	NA
Wound infection	2 (0.7)	1 (0.5)	NA
Wound reopening	3 (1.1)	2 (1.0)	NA
Neonatal composite components	51.9%	63.8%	0.71 (0.48–1.06)
Neonatal death	3 (1.3)	3 (1.7)	NA
Intrapartum stillbirth	2 (0.7)	0	NA
Subgaleal hemorrhage	0	0	NA
Intraventricular hemorrhage grade 3 or 4	8 (3.0)	10 (5.0)	0.45 (0.16–1.26)
Hypoxic ischemic encephalopathy	28 (11.1)	17 (8.7)	1.52 (0.79–2.94)
Neonatal enterocolitis	12 (4.4)	14 (7.0)	0.86 (0.38–1.95)
BPD	21 (7.8)	24 (12.0)	0.95 (0.50–1.81)
Confirmed sepsis	26 (9.6)	26 (13.0)	0.87 (0.48–1.59)
Hypotension requiring treatment within 30 min	6 (2.2)	7 (3.5)	0.87 (0.28–2.74)

Components	IOL	Cesarean delivery	aOR (95% CI)
Intubation or cardiac intervention within 30 min	47 (17.3)	65 (32.5)	0.55 (0.35–0.87)
Respiratory distress syndrome	79 (29.2)	82 (41.0)	0.67 (0.45–1.00)
Mechanical ventilation for >7 d	20 (7.4)	30 (15.0)	0.66 (0.36–1.23)
5-min Apgar <4	12 (4.4)	6 (3.0)	2.38 (0.85–6.66)

Data are presented as number (percentage) or mean±standard deviation, unless otherwise specified for adjustments.

aOR, adjusted odds ratio, *BPD*, bronchopulmonary dysplasia; *CI*, confidence interval; *ICU*, intensive care unit; *IOL*, induction of labor; *NA*, not applicable owing to small numbers (n<6).

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TABLE 3

Maternal and neonatal morbidity composite score by 24^0–28^6 and 29^0–$<33^0$ weeks in hypertensive disorders of pregnancy by induction of labor vs prelabor cesarean delivery

	Maternal composite			
Weeks GA	**IOL**	**Cesarean delivery**	**OR (95% CI)**	**aOR (95% CI)**
24^0–$<33^0$	10.2%	21.1%	0.42 (0.25–0.72)	0.44 (0.26–0.76)
24^0–$<28^6$	17.9%	22.2%	0.76 (0.31–1.88)	0.79 (0.31–1.97)
29^0–$<33^0$	8.1%	20.6%	0.34 (0.18–0.65)	0.33 (0.17–0.65)
	Neonatal composite			
GA (wk)	**IOL**	**Cesarean delivery**	**OR (95% CI)**	**aOR (95% CI)**
24^0–$<33^0$	51.9%	63.8%	0.61 (0.42–0.89)	0.71 (0.48–1.06)
24^0–$<28^6$	85.7%	87.5%	0.86 (0.30–2.46)	0.90 (0.31–2.61)
29^0–$<33^0$	42.8%	52.6%	0.67 (0.44–1.04)	0.67 (0.42–1.06)

aOR, adjusted odds ratio; *CI*, confidence interval; *GA*, gestational age; *IOL*, induction of labor; *OR*, odds ratio.

TABLE 4

Delivery outcomes in patients who underwent induction of labor <33^0 weeks for hypertensive disorders of pregnancy

GA	Vaginal delivery % (95% CI)	Length of IOL (h)[a]
24^0–<33^0 wk	52.8 (46.8–58.7)	13.9 (8.7–22.2)
24^0–28^6 wk	39.3 (26.5–52.1)	15.2 (8.7–23.4)
29^0–<33^0 wk	56.3 (49.7–62.9)	13.3 (8.6–22.0)

CI, confidence interval; *GA*, gestational age; *IOL*, induction of labor.

[a]Median (interquartile range).

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TABLE 5

Characteristics associated with vaginal delivery and duration of labor follow induction of labor for hypertensive disorders of pregnancy at $<33^0$ weeks gestation

Characteristics associated with vaginal delivery	
	aOR (95% CI)
Parous	4.88 (2.46–9.71)
Small for gestational age	0.33 (0.16–0.69)
Maternal BMI at delivery	0.96 (0.93–0.997)
24–28 wk	0.36 (0.18–0.70)
Private insurance	0.46 (0.23–0.92)
Maternal age	0.94 (0.89–0.99)
Characteristics associated with duration of labor	
	aOR (95% CI)
African American	1.43 (1.07–1.92)
Maternal BMI at delivery	0.98 (0.96–0.99)

aOR, adjusted odds ratio; *BMI*, body mass index; *CI*, confidence interval.