

RETROSPECTIVE DATABASE STUDY TO INVESTIGATE THE EFFECT OF PHENYLEPHRINE INFUSION PROPHYLAXIS DURING CESAREAN DELIVERY UNDER SPINAL ANESTHESIA ON NEONATAL ACIDOSIS

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INTRODUCTION

Maternal hypotension after spinal anesthesia is associated with neonatal acidosis, (Knigin D; AJOG. 2021) yet this is potentially modifiable through use of prophylactic vasopressors (Kinsella M; Anaesthesia. 2018)

PRIMARY STUDY AIM

To investigate the effect of **prophylactic phenylephrine (PE)** infusion, administered to avoid hypotension, on the occurrence of **neonatal acidosis (pH< 7.1)**, in a population undergoing **elective cesarean delivery (CD)** under **spinal anesthesia**

Prophylactic PE infusion was introduced in 2018; prior to that, vasopressor boluses were administered as needed to treat hypotension

METHODS

Study Design: Retrospective analysis with IRB approval

Inclusion criteria: Spinal anesthesia, elective CD

Exclusion criteria: Missing pH, missing blood pressure data, multiple gestation

Period of interest: Spinal anesthesia injection until neonatal delivery

Data retrieved from anesthesia and labor ward electronic medical records

Primary measures: Spinal hypotension

(drop of systolic blood pressure <100 mmHg or <80% below baseline) and prophylactic PE (starting dose 50 mcg/min)

Primary outcome: **Neonatal acidosis association with prophylactic PE**

Secondary outcome: Spinal hypotension (sporadic/sustained) association with prophylactic PE

Multivariable logistic regression characterized the associations between prophylactic PE and neonatal acidosis; spinal hypotension, and after adjusting for potential confounders (significant p<0.2 univariable analysis)

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Study period 2016-2021; Total cohort n=4329, mean (SD): age 35(5) years; BMI 29(5) kg/m² ; birth weight 3.2(0.5) kg; spinal anesthesia to delivery time 17(6) mins

PE prophylaxis vs. vasopressor boluses as needed
Hypotension occurrence / Neonatal outcomes

Total cohort N=4329	Prophylactic phenylephrine N=1789	Vasopressor boluses as needed N=2540	p-value
Zero vasopressor boluses administered	1147(64.1%)	1114(43.9%)	<0.001
Sporadic hypotension			
At least one SBP < 100 mmHg (%)	487(27.2%)	1168(46%)	<0.001
At least one SBP < 80% of baseline (%)	546(30.5%)	952(37.5%)	<0.001
Sustained hypotension			
Under 100mmHg > 90 th percentile	117(6.5%)	281(11.1%)	<0.001
Under 80% of baseline > 90 th percentile	123(6.9%)	275(10.8%)	<0.001
Neonatal outcomes			
Mean pH, mean ±SD	7.27±0.07	7.27±0.06	0.663
Umbilical arterial pH < 7.1 (%)	39(2.2%)	46(1.8%)	0.389
Apgar 1 min, median (IQR, range)	9 (9-9,1-10)	9 (9-9,1-10)	0.400
Apgar 5 min, median (IQR, range)	10 (10-10,5-10)	10 (10-10,4-10)	0.225

Multivariable logistic regression
adjusted model for primary outcome,
neonatal acidosis, pH<7.1

	Odds ratio (95% CI)	p- value
Prophylactic phenylephrine infusion administered	1.23 (0.78-1.94)	0.367
Sustained hypotension	1.81 (1.08-3.03)	0.024
Maternal BMI	1.08 (1.03-1.12)	<0.001
Time from spinal anesthesia to delivery over 50 th percentile	2.35 (1.41-3.92)	0.001

In adjusted model with sporadic hypotension, sporadic
hypotension also not associated with neonatal acidosis

Adjusted multivariable logistic
regression models for hypotension

Sporadic hypotension, adjusted OR (95% CI):

Maternal age 1.02 (1-1.03) p=0.007

Maternal BMI 1.02 (1-1.03) p=0.011

Prophylactic PE 0.45 (0.4-0.52) p<0.0001

Spinal anesthesia to delivery time 1.02 (1.01-
1.04) p<0.0001

Neonatal birth weight 1.16 (1.01-1.34) p=0.034

Not associated with sporadic hypotension in
adjusted model: Maternal ASA>2; Hypertensive
disease of pregnancy; Spinal bupivacaine dose

Sustained hypotension adjusted OR (95% CI):

Maternal age 1.02 (1.01-1.04) p=0.008

Maternal BMI 1.04 (1.02-1.06) p<0.0001

Prophylactic PE 0.53 (0.43-0.64) p<0.0001

Spinal anesthesia to delivery time 1.05 (1.04-
1.07) p<0.0001

Not associated with sustained hypotension in
adjusted model: Neonatal birth weight; Maternal
ASA>2; Hypertensive disease of pregnancy; Spinal
bupivacaine dose

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- ✓ Neonatal acidosis ($\text{pH} < 7.1$) occurred in 2% of neonates delivered by elective CD under spinal anesthesia
- ✓ Prophylactic PE associated with
 - ↓ sporadic hypotension
 - ↓ sustained hypotension
 - ↓ vasopressor bolus treatment needed
- ✓ In the unadjusted and adjusted models, prophylactic PE (to prevent hypotension) was not associated with decreased likelihood of neonatal acidosis. Higher maternal BMI (continuous), longer time from spinal anesthesia to delivery and occurrence of sustained (not sporadic) hypotension were associated with increased likelihood of neonatal acidosis

Conclusions

Despite the unsurprising finding that **prophylactic PE** was associated with less spinal hypotension, it was **not associated with decreased likelihood of neonatal acidosis**

These data do not suggest that prophylactic PE should not be used, rather we suggest that the association between spinal hypotension and neonatal acidosis in planned CD under spinal anesthesia is more complex than avoiding drops in systolic blood pressure