



Anesthesia Management for Intrapartum Cesarean Delivery: A Retrospective Comparison Between Extended Epidural and New Spinal Anesthesia

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Introduction

- Up to 20% of laboring women convert to cesarean delivery (CD) due to maternal or fetal complications, failure to progress, social factors, and malpresentation.
- In laboring parturients, an estimated 20% experience non-reassuring fetal heart tones after initiation of neuraxial analgesia.
- Maternal hypotension can lead to fetal hypotension and hypoxia, resulting in acidemia if not resolved quickly.
- The optimal anesthesia technique for failed trial of labor and conversion to CD has not been determined.

Objectives

- The goal of this study was to determine whether the type of anesthesia, either epidural extended from labor analgesia versus new spinal anesthesia, affects the incidence of fetal acidemia ($\text{pH} \leq 7.15$) in parturients undergoing intrapartum CD.
- Secondary outcomes include: the need for positive pressure ventilation (PPV)/continuous positive airway pressure (CPAP) and NICU admissions.

Methods

- Screened 1104 intrapartum CDs from September 2019 through February 2021
- **Inclusion criteria:** Women with singleton full-term deliveries (gestational age > 36 weeks and 6 days and < 42 weeks and 0 days) who initially received epidural analgesia but converted to CD anesthesia due to maternal or fetal complications
- **Exclusion criteria:** Need for general anesthesia prior to delivery, cord gas values of ≥ 29 mmHg, no cord gas results available, suspected or confirmed placental pathology during delivery, emergent CDs that did not allow for the placement of a new combined spinal-epidural or spinal epidural
- Maternal characteristics including age, race, height, baseline weight, medical comorbidities (chronic hypertension, gestational hypertension, preeclampsia, severe preeclampsia, eclampsia, and diabetes) as well as the use of magnesium/hypotension therapy during labor were collected (**Table 1**).
- Neonatal outcome variables including the newborn's umbilical artery (UA) blood gas, the need for assisted ventilation, and NICU admissions were collected.



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Results

- 699 women met the inclusion criteria. 624 women were in the extended epidural group, while new spinal anesthesia was performed in 75 patients.
- Gestational hypertension and severe pre-eclampsia were more prevalent in the new spinal group (35% and 25%) than the epidural group (21% and 15%). Subsequently, more patients received magnesium therapy in the spinal group (27% vs. 16%).

Table 1. Descriptive Statistics of Women in Epidural and New Spinal (CSE) Groups

	Epidural (n=624)	New Spinal (CSE) (n=75)	p
Age (years)	27.3	26.2	0.147 ^a
Race/Ethnicity			
Hispanic	384 (61.5%)	45 (61.09%)	0.476 ^b
Caucasian	50 (8.01%)	10 (7.92%)	
African American	169 (27.08%)	18 (22.73%)	
Asian	19 (3.04%)	2 (3.03%)	
Other	2 (0.32%)	0 (0.00%)	
Height (inches)	62.3	62.6	0.421 ^a
Weight (pounds, before delivery)	191.2	195.2	0.246 ^a
Gestational Age	39.5	39.0	0.046 ^a
Chronic Hypertension	42 (6.73%)	6 (8.00 %)	0.631 ^c
Gestational Hypertension	128 (20.51%)	26 (34.66%)	0.008 ^c
Diabetes	52 (8.33%)	7 (9.33%)	0.825 ^c
Pre-Eclampsia	16 (2.56%)	4 (5.33%)	0.258 ^c
Severe Pre-Eclampsia	94 (15.06%)	19 (25.33%)	0.030 ^d
Eclampsia	0 (0.00%)	0 (0.00%)	N/A
Magnesium therapy	99 (15.84%)	20 (26.66%)	0.023 ^c
Hypotension therapy	38 (6.09%)	10 (13.33%)	0.122 ^c

^a T-Test

^b χ^2 Test

^c Fisher's Exact Test

Results

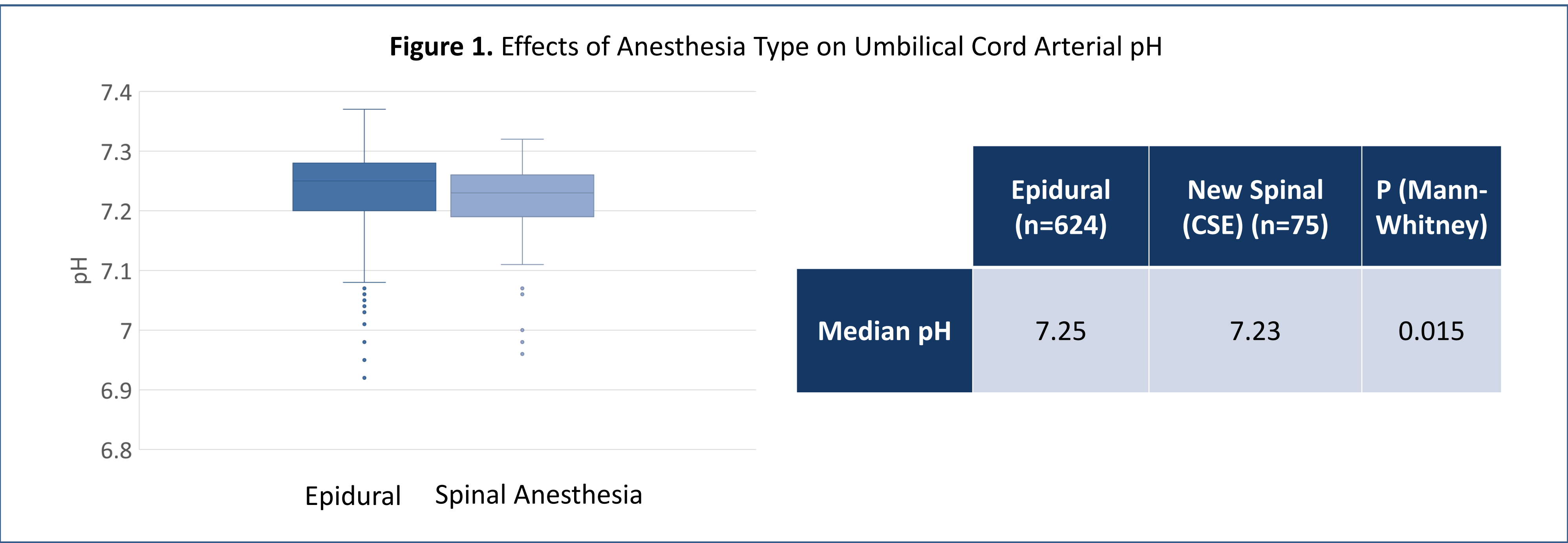
- The relative incidence of fetal acidemia in the spinal anesthesia group was higher, 17.3%, compared to the epidural group, 10.0%.
- Spinal anesthesia resulted in a lower UA pH compared to epidurals (7.23 vs 7.25).
- While there is a greater incidence of NICU admission and PPV/CPAP in the spinal anesthesia group (21.3%/12% vs 13.6%/9%), the differences were not statistically significant.

Type of Anesthesia	pH ≤ 7.15	pH > 7.15	Type of Anesthesia	NICU	No NICU	Type of Anesthesia	PPV/CPAP	No PPV/CPAP
Epidural	62 (10.0%)	562 (90.0%)	Epidural	85 (13.6%)	539 (86.4%)	Epidural	56 (9.0%)	568 (91.0%)
Spinal	13 (17.3%)	62 (82.7%)	Spinal	16 (21.3%)	59 (78.7%)	Spinal	9 (12.0%)	66 (88.0%)

Table 2. Effects of Anesthesia Type on Fetal Acidemia (pH ≤ 7.15). Chi Squared p=0.05.

Table 3. Effects of Anesthesia Type on NICU Admission. Chi Squared p=0.73.

Table 4. Effects of Anesthesia Type on Neonatal Oxygen Supplementation. Chi Squared p=0.39.





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Conclusions

- Our study highlights the importance of high-quality labor epidural placement to avoid new spinal anesthesia in the operating room and subsequent fetal acidemia as the relative incidence of fetal acidemia in the spinal anesthesia group was higher compared to the epidural group.
- The higher incidence of fetal acidemia in the new spinal group could be due to the higher prevalence of gestational hypertension and severe pre-eclampsia, which are known causes of intrauterine hypoxia.
- Antihypertensive therapy may also play a role in fetal acidemia, although there was no statistically significant difference between the two groups.
- Although spinal anesthesia do not lead to higher incidences of NICU admission or supplemental ventilation, it results in a subclinical manifestation of fetal acidemia that may impact brain development.

Acknowledgements

- We are grateful for the contributions of the University of Texas Southwestern Medical Center Department of Anesthesiology and Pain Management and the Division of Obstetric Anesthesiology Teams at both UT Southwestern and Parkland Memorial Hospital.
- In addition, we thank the UT Southwestern Department of Statistics for their guidance and assistance with the project.

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