



Conversion of labor analgesia for intrapartum cesarean delivery: dural puncture epidural vs combined spinal epidural vs epidural

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BACKGROUND

- Conversion of neuraxial (NA) labor analgesia to surgical anesthesia via epidural catheter is frequently used for laboring women requiring cesarean delivery (CD), potentially avoiding adverse events during general anesthesia (GA) such as failed intubation or pulmonary aspiration.
- Previously demonstrated risk factors for failure of epidural conversion include: increased clinician boluses during labor, greater urgency for CD, and a non-obstetric anesthesiologist providing care.¹
- Use of combined spinal-epidural (CSE) during labor compared to epidural may reduce failure of conversion.²
- While some studies do not indicate analgesia benefit with the dural puncture epidural (DPE) technique,³ others have demonstrated proposed advantages that include quick block onset, less unilateral blocks and decreased clinician boluses.⁴

AIM

- To determine if the DPE technique was associated with increased successful conversion of neuraxial analgesia for CD compared to epidural and CSE.

METHODS

- Retrospective search from February 1, 2017 through May 31, 2021 of all patients with NA labor analgesia and subsequent CD.
- Excluded if no local anesthetic administered via epidural catheter or inadvertent Tuohy dural puncture
- The following data were retrieved: type of neuraxial block, size of needle used for DPE/CSE, duration of time from epidural placement until CD, number of epidural top-ups, type and amount of medication used for conversion to surgical anesthesia, urgency of cesarean delivery (category I-III), airway documentation indicative of GA and length of surgical procedure, maternal demographics, fetal characteristics, indication for delivery and if the anesthesiologist at the time of CD was trained in obstetric anesthesiology.
- ‘Failure of epidural catheter conversion’ was defined as a new NA block at time of CD or use of GA.
- Patient, anesthetic, and procedure characteristics were presented according to type of neuraxial block as median (Q1, Q3) for continuous variables and number (percentage) for categorical variables. Magnitudes of pairwise differences were presented as standardized differences. Rates of failure of surgical conversion were compared across block types using the Chi-square test

TABLE 1

Table 1 – Patient Characteristics, N = 706

	Dural Puncture Epidural (N=322)	Combined Spinal- Epidural (N=129)	Epidural (N=255)	Standardized differences		
				DPE vs. CSE	DPE vs. EPI	CSE vs. EPI
Age, years	30 (27, 32)	30 (27, 34)	30 (27, 33)	0.109	0.020	0.088
BMI, kg/m ²	33 (29, 38)	31 (28, 36)	32 (28, 36)	0.254	0.207	0.048
Parous	72 (22%)	57 (44%)	54 (22%)	0.476	0.029	0.506
Gestational age, weeks	39.7 (39.1, 40.6)	40.0 (39.1, 40.6)	40.0 (39.1, 40.7)	0.132	0.122	0.002
OB Fellowship trained consultant	126 (39%)	48 (37%)	71 (28%)	0.040	0.241	0.201
Number of epidural top-ups/boluses						
0	210 (65%)	86 (67%)	186 (73%)	0.031	0.168	0.137
1	75 (23%)	28 (22%)	45 (18%)	0.038	0.140	0.102
2+	37 (11%)	15 (12%)	24 (9%)	0.004	0.068	0.072
Minutes from epidural to CD	680 (388, 947)	481 (257, 744)	601 (379, 912)	0.463	0.074	0.378

*Continuous variables are summarized as median (25th percentile, 75th percentile). Categorical variables are summarized as frequency (percentage). OB = obstetric, CD = cesarean delivery

TABLE 2

Table 2 – Likelihood of Converting to GA Based Upon Labor Analgesia Block Type

	Odds Ratio (95% CI)	P Value
Primary analysis		
Block type		0.487
Epidural	Referent	
Combined spinal/epidural	0.68 (0.34, 1.37)	
Dural puncture epidural	0.77 (0.44, 1.35)	
Secondary analyses		
Spinal needle gauge (n=697)		0.444
No spinal (epidural)	Referent	
27g	0.63 (0.30, 1.32)	
25g	0.79 (0.45, 1.38)	
Dural puncture		0.247
No	Referent	
Yes	0.74 (0.44, 1.23)	

* All models are adjusted for age, BMI, gestational age, parity, number of previous CS, date of CS, trained OB anesthesia fellow at time of CS, number of epidural bolus, time from epidural placement to CS, and emergent CS status. For each model, all two-way interactions between the exposure of interest and covariables were assessed. Not meaningful two-way interactions were identified. Odds ratios represent the multiplicative increase in odds of failure to convert to anesthesia for CS associated with the given characteristic. Corresponding 95% confidence intervals and p-values are also presented.

RESULTS

- During the study period, 706 parturients with NA labor analgesia required CD and met inclusion criteria.
- Labor neuraxial analgesia type: 322 (45.6%) DPE, 255 (36.1%) epidural, and 129 (18.3%) CSE.
- Overall 90 (12.7%) had failed labor epidural conversion to surgical anesthesia and required a repeat neuraxial procedure (31, 4.4%) and/or general anesthetic (69, 9.8%).
- Women who had a CSE were more likely to be multiparous. Women with CSE and DPE were more likely to be cared for by a fellowship trained OB anesthesiologist .
- Models adjusted for age, BMI, gestational age, parity, number of previous CD, date of CD, trained OB anesthesia fellow at time of CD, number of epidural bolus, time from epidural placement to CD, and emergent CD status.
- All two-way interactions were assessed and we found no meaningful interactions indicating that the effect of block type does not differ according to covariates in the model.

DISCUSSION

- We did not find a statistical difference in neuraxial labor analgesia conversion failure for CD between DPE, CSE, and epidural in univariable analysis.
- In table 2 we see that there is no effect of block type on outcome. The estimates for DPE and CSE are in the protective direction, but the confidence interval excludes significance.
- Similarly, there was no effect when looking at parameters of needle gauge or “any dural puncture” although the estimates for any dural puncture were in a positive direction.
- Our study may be underpowered to detect a difference between groups.
- Larger, randomized, prospective studies are needed to evaluate outcomes of labor analgesia techniques.

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