

Clinical Characteristics and Biomarkers Associated with Perinatal Depression and Persistent Pain in Parturients undergoing Cesarean Delivery

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- Severe acute pain after cesarean delivery (CD) increases risk of developing persistent pain (23% incidence)¹ and perinatal depression (15% incidence)²
- Neuroinflammation has emerged as a mediator of persistent pain in non-obstetric population, but most studies have focused on plasma cytokines which may not reflect neuro-cytokines
- Primary aim: compare neuroinflammatory cytokine profiles between parturients who develop the composite outcome of persistent pain or perinatal depression versus those who do not

Methods

- Term singleton pregnancies undergoing cesarean delivery under spinal or combined spinal epidural anesthesia
- Baseline characteristics, pain score and Edinburgh Postnatal Depression Scale (EPDS) obtained and quantitative sensory tests performed (mechanical temporal summation and pain tolerance)
- 10 ml of blood collected preoperatively and 48 hours post cesarean delivery
- 10 ml CSF collected prior to administration of standard neuraxial anesthetic
- Primary Outcome: composite outcome of persistent pain (pain score ≥ 3) or perinatal depression (EPDS ≥ 10) versus none at 3 months postpartum
- This analysis investigates clinical factors associated with the primary outcome
 - Factors associated with the outcome at $P = 0.20$ in univariate analysis included in multivariable logistic regression model
 - Final model constructed via backward selection based on AIC and Firth's correction applied
 - Model odds ratio (OR) and 2-sided p-values are reported with significance at the 0.05 level

Results

Table 1a: Univariable Analysis

Variable	Neither Pain nor PND (N= 40)	Pain or PND at 3 months (N= 23)	P- Value
Age (years)	34 (31, 37.5)	34 (32, 38)	0.913
BMI (kg/m ²)	33.23 (29.70, 38.90)	33.85 (28.87, 40.59)	0.727
Race			0.063
Asian	7 (17.5%)	2 (8.7%)	
Black	8 (20.0%)	9 (39.1%)	
Caucasian	22 (55.0%)	9 (39.1%)	
Hispanic	0 (0.0%)	1 (4.3%)	
Not reported/Declined	0 (0.0%)	2 (8.7%)	
Other	3 (7.5%)	0 (0.0%)	
Estimated gestational age (weeks)	39 (38, 39)	39 (37, 39)	0.081
Gravity	3 (2, 4)	3 (2, 4)	0.378
Parity	1 (1, 2)	2 (1, 2)	0.123
History of CD	34 (85%)	18 (78.3%)	0.498
Prior Surgery (other than CD)	20 (50%)	21 (91.3%)	<0.001
History of Preeclampsia	6 (15.0%)	3 (13.0%)	0.831
History of Gestational Diabetes	9 (22.5%)	2 (8.7%)	0.165
History of Chronic pain	2 (5.0%)	3 (13.0%)	0.256
History of Major Depressive Disorder	5 (12.5%)	2 (8.7%)	0.644
History of PND	4 (10.0%)	4 (17.4%)	0.396
History of Anxiety	9 (22.5%)	7 (31.8%)	0.422
Smoking History			0.010
Never Smoked	36 (90.0%)	13 (59.1%)	
Previous Smoker	4 (10.0%)	7 (31.8%)	
Current Smoker	0 (0.0%)	2 (9.1%)	
Anxiety Score (0 – 100)	37.5 (20, 50)	50 (40, 80)	0.036
Anticipation of Pain (0 – 100)	50 (35, 60)	50 (35, 75)	0.884
Preoperative EPDS Score (0 – 30)	4 (2, 6)	6 (3, 8)	0.073
Preoperative MTS Score (#11 - #1)	0 (0, 0)	0 (0, 1)	0.171
Preoperative PPT Score RIGHT average kPa	3.45 (2.10, 5.45)	3.50 (2.60, 6.00)	0.534
Preoperative PPT Score LEFT average kPa	3.30 (2.15, 6.00)	3.80 (2.70, 6.60)	0.339

- 80 subjects enrolled and 63 completed the study
- 23 (36.5%) had persistent pain or perinatal depression

Table 1b: Multivariable Logistic Regression with Firth's Correction

Effect	Odds Ratio (95% CI)	P-Value
Gestational Age (per week)	0.54 (0.27, 1.07)	0.078
Gestational Diabetes (Y v N)	0.43 (0.06, 3.23)	0.412
Prior Surgery (other than CD) (Y v N)	11.48 (2.00, 65.81)	0.006
Medicine for Chronic Pain (Y v N)	2.09 (0.21, 20.40)	0.526
History of Anxiety (yes or no)	0.55 (0.13, 2.36)	0.423
Preoperative Anxiety Score (per point)	1.03 (1.00, 1.05)	0.024

Values are in median (Q1, Q3) and count (%). CD: Cesarean Delivery, PND: Perinatal Depression, EPDS: Edinburgh Postnatal Depression Scale, MTS: Mechanical Temporal Summation, PPT: Pain Pressure Threshold, kPa: kilopascal