

Management of indwelling labor epidural catheters for intrapartum cesarean delivery: a single-center retrospective study

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BACKGROUND

Cesarean Delivery

Activation of existing
labor epidural (“Top Up”)

Removal of existing
epidural, replacement
with new neuraxial
technique

Laboring Patient
with epidural

- Multiple physician-administered rescue analgesia boluses
- > 12 hours of labor epidural analgesia
- Unsatisfactory labor epidural analgesia

- Epidural top-up rate of requiring intra-op adjuncts: **~13%**¹
rate of conversion to GA: **~8%**
- Pain during CD remains a significant clinical issue
- Prior data at our hospital: **4.3× higher adjunct-free anesthesia** with catheter removal²
- **Clinical dilemma:** Top-up labor epidural vs replace epidural?

HYPOTHESIS

We hypothesized that removal of an indwelling labor epidural catheter would be independently associated with adjunct free anesthesia for intrapartum cesarean deliveries (CD) compared to catheter top up.

STUDY DESIGN AND METHODS

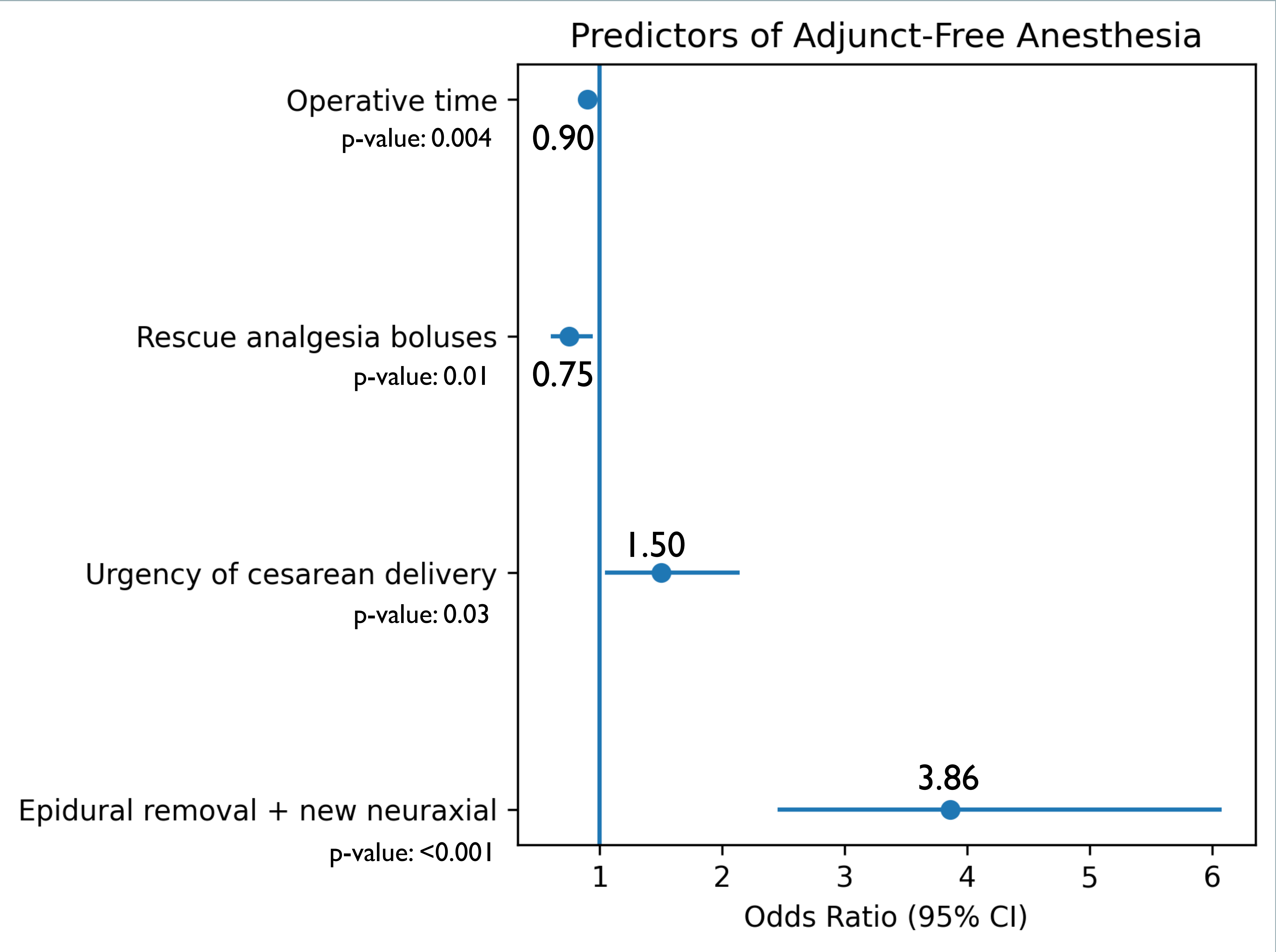
- Retrospective chart review
- Patients with indwelling labor epidural catheters who underwent intrapartum CD with attempted regional anesthesia between July 1, 2023 and June 30, 2025 at a single institution
- Defined adjunct anesthetic medications as intraoperative administration of intravenous dexmedetomidine, fentanyl, ketamine, propofol, midazolam, inhaled nitrous oxide, or conversion to general anesthesia (GA)
- Performed bivariate analysis between patients who did and did not have adjunct-free anesthesia.
- Performed multivariate logistic regression with variables of interest to determine which patient and clinical characteristics were independently associated with adjunct-free anesthesia

Demographic, physical, and clinical characteristics of cohorts

Variable	Adjunct free anesthesia (N=299)	Received one or more adjunct mediations (N=198)	P value
Race			0.96
Age (years) (median (IQR))	27 (23-32)	28 (23-32)	0.75
Body mass index (kg/m²) (median (IQR))	37.2 (32.4-42.7)	36.4 (32.5-41.6)	0.40
Gravidity (median) (IQR))	1 (1-2)	1 (1-2)	0.87
Parity (median (IQR))	0 (0-1)	0 (0-1)	0.85
Gestational age (weeks (IQR))	39.0 (37.4-40.0)	38.7 (37.2-39.9)	0.25
Multiple gestation (yes)	5 (2%)	3 (2%)	1.00
History of cesarean delivery (yes)	37 (12%)	19 (10%)	0.3
History of depression (yes)	45 (15%)	42 (21%)	0.08
History of anxiety (yes)	48 (16%)	46 (23%)	0.045
Reason for admission			0.10
Spontaneous labor	38 (13%)	26 (13%)	
Elective induction	104 (35%)	51 (26%)	
Medically indicated induction	157 (53%)	121 (61%)	
Technique for last labor epidural catheter			0.57
Epidural	261 (87%)	176 (89%)	
Dural puncture epidural	29 (10%)	19 (10%)	
Combined spinal epidural	9 (3%)	3 (2%)	
Training of operator for last labor epidural			0.63
Intern (PGY-1)	8 (3%)	7 (4%)	
CA1 (PGY-2)	218 (73%)	137 (69%)	
CA 2 (PGY-3)	37 (12%)	27 (14%)	
CA-3 (PGY-4)	29 (10%)	24 (12%)	
Attending anesthesiologist	7 (2%)	3 (2%)	
Labor epidural catheter replaced (yes)	22 (7%)	22 (11%)	0.15
Time from labor epidural placement to entering operating room (hours) (median (IQR))	11.2 (6.6-17.5)	10.1 (5.6-16.6)	0.25
Number of physician-administered rescue analgesia boluses (median (IQR))	0 (0-1)	0 (0-1)	0.58
Urgency category documented for cesarean delivery			0.43
Add on	58 (19%)	48 (24%)	
Priority	210 (70%)	131 (66%)	
Emergent	31 (10%)	19 (10%)	
Anesthesia for cesarean delivery			<0.001
Top up of indwelling labor epidural catheter	132 (44%)	135 (68%)	
Removal of indwelling labor epidural catheter followed by attempt at new neuraxial technique	167 (56%)	63 (32%)	
Time from skin incision to wound closure (minutes) (median (IQR))	45 (37-53)	49 (39-61)	0.008

RESULTS

Multivariate logistic regression to predict adjunct free anesthesia for CD



N=497
c-statistic: 0.71

CONCLUSION

Removal of an indwelling labor epidural catheter with subsequent placement of a new neuraxial technique before transition to CD is associated with 4x higher likelihood of adjunct-free anesthesia

- Characteristics independently associated with adjunct-free during CD
 - physician-administered rescue analgesia boluses during labor
 - urgency of CD
 - operative time
- Consider early catheter replacement when epidural performance is suboptimal
- Future prospective patient-reported outcome studies are needed to evaluate the practice of removal of indwelling labor epidural catheters for CD.

1. Stav MY, Fein S, Matatov Y, et al. Conversion to general anesthesia and intravenous supplementation during intrapartum cesarean delivery with an indwelling epidural catheter: a retrospective study. *Reg Anesth Pain Med* 2025;50:873-878.
2. Shepherd B, Sharpe EE, Hammonds K, Hofkamp MP. A comparison of anesthetic outcomes between activation and removal of epidural catheters for patients who underwent unscheduled intrapartum cesarean delivery. *Proc (Bayl Univ Med Cent)* 2023;36:473-477