



Intrapartum epidural fentanyl dose, meconium opioid concentration and short-term neonatal outcomes

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Background

- Meconium drug screening is used to detect maternal drug use during 2nd or 3rd trimester of pregnancy, however positive testing for fentanyl in meconium in cases where epidural analgesia with fentanyl was given was recently reported.¹
- The effect of acute epidural fentanyl exposure during delivery on clinical outcomes among neonates chronically exposed in utero to opioids has not been evaluated.

Goals of this study

- Evaluate meconium fentanyl concentrations and neonatal clinical outcomes after chronic exposure to systemic opioids prescribed during pregnancy and acute exposure to epidural fentanyl during delivery.

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Subjects = 13 mothers with chronic opioid exposure (> 2 weeks of prescribed opioid use during pregnancy)

- Buprenorphine, codeine, fentanyl, hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone

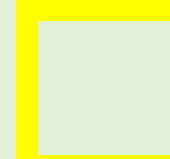
Methods = Meconium collected at birth - Opioid concentrations measured using ultra-performance LC-MS/MS.

- **Primary outcome: adverse neonatal outcome** - composite outcome with ≥ 2 criteria:
Neonatal resuscitation; NICU admission (> 1 day); IV morphine use; Finnegan score (> 7); LOS > 5 days

Analysis = effect of maternal epidural fentanyl dose on fentanyl meconium concentrations and neonatal outcomes

- Three-group analysis between cases with cesarean delivery with spinal anesthesia (no epidural fentanyl), intrapartum cesarean delivery and vaginal delivery cases (with epidural fentanyl)

Results

- Epidural fentanyl doses ranged between 0-800mcg over up to 36h of neuraxial labor analgesia.
- Cases with a cesarean delivery without previous epidural labor analgesia received spinal anesthesia (no epidural fentanyl).
- The mean total epidural fentanyl dose was the highest in the intrapartum cesarean delivery group.
- Adverse neonatal outcomes occurred in 4/13 cases - indicated with a yellow highlighted box  - 3 of which had a VAGINAL delivery.
- **There was a strong correlation between total epidural fentanyl dose and meconium fentanyl concentrations.**

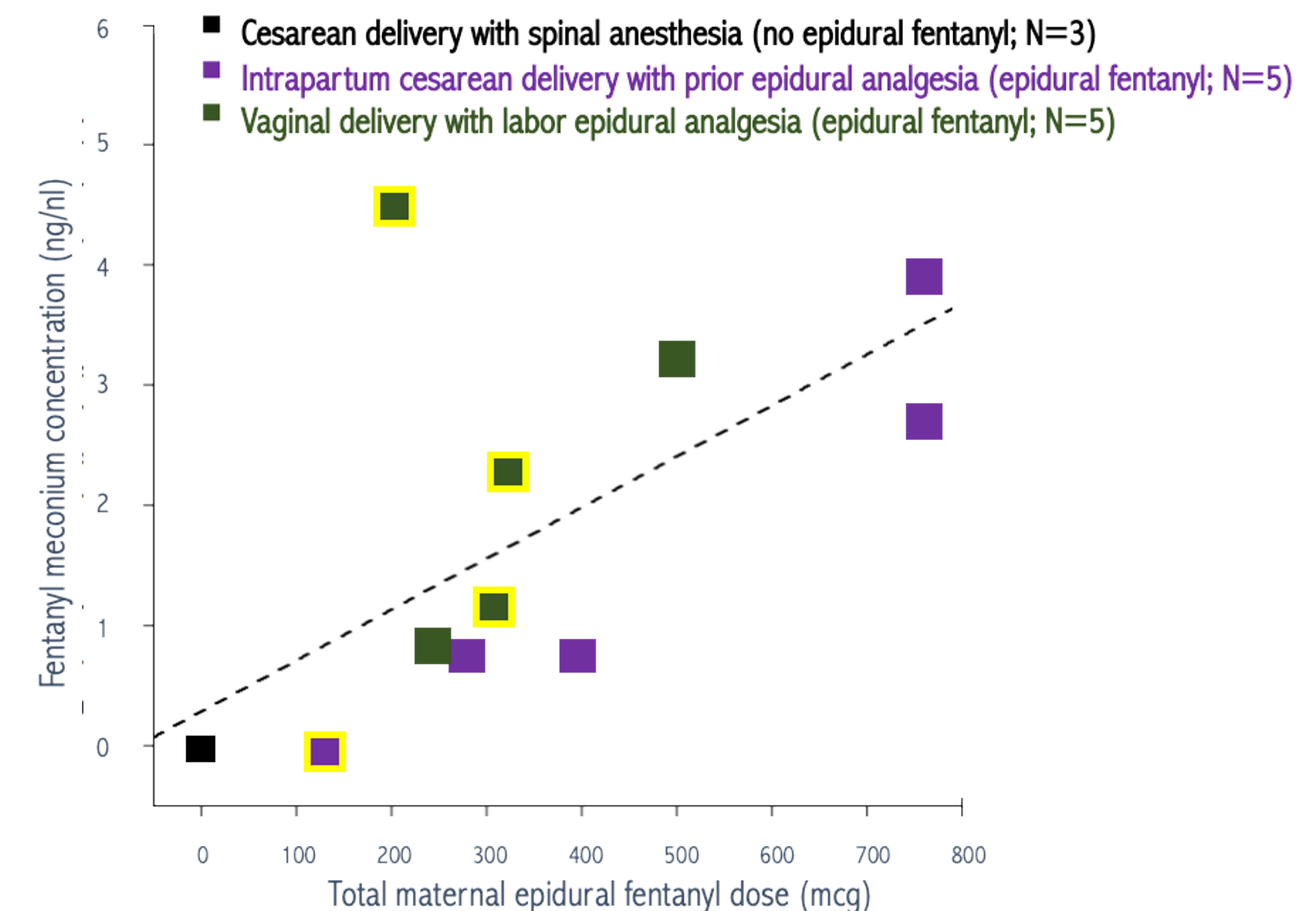


Figure. Correlation between total maternal epidural fentanyl dose (mcg) and meconium fentanyl concentration (ng/g).

Spearman correlation coefficient = 0.728 (95% CI: 0.291, 0.982).

The 95% CI is estimated using bootstrap with replacement (B=10,000) and the percentile method.

Linear regression with total epidural fentanyl dose as the independent variable and meconium fentanyl concentration as the dependent variable.

Regression coefficient unadjusted = 0.004 (95% CI: 0.002, 0.007).

Regression coefficient adjusted for delivery mode (3 classes) = 0.005 (95% CI: 0.001, 0.008).

Key Points

- We had not expected to find fentanyl in meconium following neuraxial labor analgesia with epidural fentanyl, although this was recently reported.
- There was a strong correlation between total intrapartum fentanyl epidural dose and meconium fentanyl levels, confirming that labor epidural analgesia with fentanyl does result in acute fetal exposure to fentanyl; **nonetheless it is extremely unlikely that this acute exposure, added to the chronic opioid exposure, precipitated adverse neonatal outcomes observed in 4 cases in our small cohort, of which 3 were vaginal births.**
- This has implications for opioid screening programs but the exact clinical relevance of this finding merits further exploration.



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