Pharmacologic Approaches to Obstetrical Anesthesia

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Options

- **Bupivacaine**
  - Load 10-15ml 0.125 - 0.25%
  - Infuse 0.625% – 0.125%

- **Ropivacaine**
  - Load 10-15ml 0.1 – 0.2%
  - Infuse 0.2% - 0.5%

- **Add Fentanyl or Sufentanil to above 2µg/ml or 0.05µg/ml**

- **Add epinephrine 1:200,000 to 1:800,000**

- **Fentanyl**
  - Load 50-100µg in 10ml
  - Infuse 1-4 µg/ml
What’s the difference?
Heavy local anesthetic solutions

- 0.25% bupivacaine
- **Great** analgesia
- Good for OP babies
- Reason to avoid opioids?
- C-section potential- you’re already there!
- “Laboring down”- the time that we *want* the epidural to slow labor.
Heavy local anesthetic solutions - Big Guns

- Downside:
  - Immobility - even in bed
  - Toxicity potential
  - Push-ability? A sensory or motor defect?
  - Positioning injury potential
  - Breastfeeding
Lighter concentration + opioid

- 0.125% Bupivacaine + fentanyl 2µg/ml
- 0.2% Ropivacaine + fentanyl 2µg/ml
- Opioids “smooth out” epidural
- 0.1 Ropivacaine + fent equal to 0.2% Rop alone (Lee et al. Regional Anes & Pain Manage 27(1) 2002 Jan-Feb)

- Sufenta reduces dosage of Ropivacaine 30% (epidural) to 50% (intrathecal)
Lighter concentration + epinephrine

- **Effects:**
  - familiar: reduce blood flow; prolong action
  - analgesic: agonist at α-2 receptors
- Increases analgesia
  - epidural epinephrine 1:300,000 resulted in a 29% reduction in the MLAC of bupivacaine
  - epi prolonged time to re-dose by 90 min.
- Increases motor block
- Increases complications?
Lighter concentration + epinephrine

- 70 parturients - epidural levobupivacaine 0.125% and sufentanil 0.75 mcg/ml with or without 1:800,000 epinephrine.
- Motor block, duration of the second stage of labor tended to be higher in the epinephrine group and were associated with lower Apgar scores

Ultra-low concentration + epi + opioid

- 0.04% bupivacaine + fentanyl 2µg/ml + epinephrine 1:800,000
- 0.07% ropivacaine + 100 µg fentanyl load 15ml, followed by infusion of 0.07% rop + 2 µg/ml fentanyl
- Walking epidural
- Trimodal approach- effective analgesia
- Minimal/no motor block
- More sensitive to patchy block, abnormal presentation, etc.
- **epinephrine** 1:300,000 (66 microg) resulted in a significant 29% reduction in the MLAC of bupivacaine.
“Walking epidural”

- Controversial outcomes - generally increases maternal satisfaction without changing course of labor

- Conflicting data on duration of labor
  - (No change) Vallejo MC. Firestone LL. Mandell GL. Jaime F. Makishima S. Ramanathan S. Effect of
Opioid only

- Morphine, fentanyl, sufentanil
- Good when locals contraindicated or motor block absolutely avoided
- Higher incidence of irritating side-effects: itching, nausea
What’s the hubbub about Ropivacaine?

- Generally shows slightly better performance
  - Shorter 1st stage (90 min)
  - Preference for C-fiber blockade - challenged
  - Less instrumented delivery at high concentration (against high conc. Bup)
  - Slightly less motor block (equipotent?)
    - Questions about toxicity margin
What’s the hubbub about Ropivacaine?

- 63 parturients in multi-center, randomized, double-blinded study received 0.125% rop or bup + fentanyl 1mcg/ml.
- No difference in motor block
- Significant difference in top up doses and mobilization between institutions.
- Ropivacaine versus Bupivacaine 0.125% with fentanyl 1mcg/ml for epidural labour analgesia: Is daily practice more important than pharmaceutical choice? Girard, et al. *Acta Anaes Belg.* 2006;57:45-49.
Intrathecal Ropivacaine

Van de Velde: Anesthesiology, Volume 106(1).January 2007.149-156

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Epidural Ropivacaine

Combined spinal-epidural

- Fentanyl 10-20mcg or sufenta 2-5 mcg
- May add morphine 200mcg or bupivacaine 1-2.5mg
- Onset
- Improves coverage and epidural placement
- Avoids motor block
- FHR – vs. speeds labor +
- Test dose and “untested catheter”
Combined spinal-epidural

- Onset of analgesia is faster (5 vs. 15 min, $P < 0.001$)
- Consumption of bupivacaine is lower (7.5 vs. 11.3 mg/h, $P = 0.003$)
- Less unilateral analgesia
  (14.8% vs. 40.7%, $P = 0.002$)

Combined spinal-epidural

- Quality of analgesia better in CSE group
- Labor outcome similar
- Pruritus, paresthesia, back pain greater in CSE group.
- No difference in dural puncture or PDPH

Parity

- **Primip**
  - Load: CSE or 0.75% Lidocaine + Epi 1:400,000 10ml
  - Infusion: 0.1% Bupivacaine or Ropivacaine + Fentanyl 2µg/ml at 10ml/hr

- **Multip**
  - Load: CSE or 2% Lidocaine + Epi 1:400,000 10ml
  - Infusion: 0.25% Bupivacaine or 0.2% Ropivacaine + Fentanyl 2µg/ml at 12ml/hr

Does it matter?

Simple Menu: Labor Intrathecal

- Load: 1.75mg Bupivacaine + 15µg Fentanyl or 5µg Sufentanil
- Maintenance: 1.25 – 2.5mg Bupivacaine PRN

*Intrathecal*
Dose-response for CSE

- 2.5 mg Bup used (for convenience purposes)
- Multiple studies pin ED$_{95}$ ~1.75mg if mixed with fentanyl

Administration of labor epidural

- Intermittent bolus vs. continuous:
  - Infusion generally considered better for maintaining analgesia, with less breakthrough, but with greater anesthetic consumption
  - Bolus technique time/money saver, especially in anticipated short labors
  - Bolus technique now found to reduce drug consumption and provide better analgesia
Continuous vs. bolus

- 0.1% ropivacaine + fentanyl 2 µg/mL; PCEA + basal infusion of 5mL/h or automated bolus 5 mL every hour
- Ropivacaine consumption significantly lower in bolus group (mean=7.6 mL, vs 9.3 mL)
- Mean time to first PCEA: 268 min in bolus group vs. 104 min in infusion.
- Higher satisfaction scores in bolus group

Flow characteristics
vs. pressure
Intermittent bolus technique

- Meta-analysis of 700 patients suggests bolus technique:
  - reduces local anesthetic usage
  - improves maternal satisfaction.
  - improves instrumental delivery rate
  - reduces anesthesia interventions

Intermittent bolus technique

- Rebolus 75% of initial dose
  - Bupivacaine/Rop- every 90-120 minutes
  - Lidocaine- every 60-75 minutes
  - Chloroprocaine- every 20 minutes
Options for PCEA

- Previous solutions
- Basal infusion 0-12 ml/hr
- Bolus 3 - 5 ml
- Lockout 10 minutes
- Hourly max 20-30 ml
Anesthesia for C-Section
Spinal anesthesia for cesarean section

Spinal anesthesia for cesarean section

- Level vs. dose:
  - “for a patient 5’4 to 5’8, give X, plus 2 mg for every inch…”

- In parturients, level based upon:
  - Thoracic kyphosis, position, CSF volume/intraabdominal pressure, fetal weight, gestational age

- Remember, reduced $C_{min}$
Anesthesia for cesarean section

- What level? T₁₀, T₈, T₄
- 1.5ml of 0.75% hyperbaric bupivacaine will give level ≤ T₂ in 80% of patients and ≤ C₈ in all cases
- Increasing dose to 15mg with more progression into cervical levels
Spinal anesthesia for cesarean section

- 91 elective CS
- 10 mg ropivacaine or 6.6 mg bupivacaine or levobupivacaine both combined with sufentanil 3.3 microg.
- More motor block in bup group
- 2x redoses needed in rop group

Epidural anesthesia for cesarean section

- **Bupivacaine/Ropivacaine 0.5%**
  - Long-acting, slow onset (???)
- **Lidocaine 2% + epi 1:200,000**
  - Faster onset, esp with alkalinization
- **3% Chloroprocaine**
  - Super fast. Good for fetal distress
- 100µg Fentanyl will hasten anesthesia
Epidural anesthesia for cesarean section

- Administration:
  - 5ml aliquots every 5 min
  - Every dose is a test dose
  - Hasten progression, start in labor room for emergency
  - Not contraindicated in fetal distress
Anesthesia for cesarean section

- And don’t forget:
  - Aspiration prophylaxis
  - Pre-hydrate with non-dextrose fluids
  - Left-uterine displacement
  - Small, blunt needles
  - Ephedrine or Phenylephrine for low B/P
  - Oxygen until delivery
  - Pitocin and antibiotics after cord clamp
Cesarean section- post-op analgesia

- Epidural morphine, depo-dur,
- Spinal clonidine (75-150 mcg)
- PCEA better than IM morphine
- NSAIDs + wound infiltration with local

Monitoring after neuraxial opioids

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<th>Start Date</th>
<th>Time</th>
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**MMCI DEPARTMENT OF ANESTHESIOLOGY ORDERS FOR POST-OP EPIDURAL NARCOTIC CONTINUOUS INFUSION**

1. Do not administer sedatives or other narcotics unless approved by anesthesia personnel.

**SINGLE DOSE INTRATHecal OR EPIDURAL**

4. Astramorph or Duramorph Dose: ___ mg Epidural or Intrathecal

5. Dose administered at ________ (time) by ____________ CRNA, MD, DO

6. Assess for side effects (nausea, vomiting, pruritis, somnolence, urinary retention) with vital signs and as needed. Record respiratory rate every hour until ____________.

7. **For respiratory rate of 8/min. or less**, stop infusion, give Narcan 0.1 mg IV STAT, may repeat every 3 Minutes, up to total 0.4 mg. Notify physician after first dose of Narcan is given.

8. **For marked sedation**, stop the infusion and notify the appropriate consultant (#12 below). Re-notify when patient is fully awake or in pain.

9. Notify appropriate consultant (#13 below) for:
   - unrelieved pain or other questions regarding the epidural catheter
   - respiratory rate less than 10/min. or increasing sedation

10. Head of bed and chart marked “Intrathecal or Epidural Narcotic Protocol”

11. Head of bed elevated at least 30 degrees.

12. Lovenox (or its equivalent) and Coumadin are not to be started without informing Anesthesiologist.

**Patient Sticker:**

**Physician’s Orders**
Bolus dosing for breakthrough pain

- Don’t feel bad
- The epidural didn’t “stop working”
Bolus dosing for breakthrough pain
Bolus dosing

- 5 ml

Options:
- Infusion solution
- Need speed? – Chloroprocaine
- Need perineum? – sit
- Breakthrough pain- 0.75% Lido + epi
- Resistant pain- 0.25% Bup +/- epi
- For labor progression, increase infusion
What if she can’t have regional?

- Valid informed consent involves informing of all options
  - Biofeedback
  - Visualization
What if she can’t have regional?

- Multiple options for parenteral analgesia.
Alternative/innovative techniques

- Ropivacaine + tramadol epidural

- Nitrous oxide
Meperidine

- Widely used
- 10-25mg PCA every 10 min
- Low efficacy, low APGARs, effect mostly due to sedation.
- Prolonged neonatal effects
Fentanyl

- More effective than meperidine
- May affect neonatal feeding, increase requirement for naloxone.
- 25-100 mcg boluses, or PCA 25 mcg every 10 min.
Alfentanil

- Appears attractive due to brief effect.
- More neonatal depression than meperidine; less effective than fentanyl.

Remifentanil

- Brief duration beneficial for neonate
- Better satisfaction, effectiveness, less maternal/neonatal side-effects than meperidine.

Remifentanil

- Short half-time poses challenges in bolus administration.
- Bolus 0.25-0.5 µg/kg, with or without infusion 0.05 – 0.1 µg/kg/min
- PCA with bolus doses of 25 µg with a 2-5 min lockout
Remifentanil

- Due to pharmacokinetic delay to effect site, clinical effect outlasts blood level.
- Aparent “effect” half-life of 3 minutes
- Pain scores drop ~4-5 points (not much less than epidural)

Was there a single, simple menu...?

- Epidural load 10ml 0.75-1.5% lido or 0.125% bupivacaine
- Infusion: 0.125% bup or 0.2% ropivacaine
- 8-14ml/hr
Summary

- Many options in labor analgesia
- Can make your menu as complex or simple as you like
- Stay away from extremes, and almost any approach will be effective