Multi-Modal Innovative Approach to Post-Op Pain Control in the Obstetric Population

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Information contained below is intended for educational purposes only. Every effort has been made to ensure the information is correct and in accordance with current recommendations. However, the practicing clinician should independently verify the information before utilizing it in clinical practice.
Objectives

Upon completion of this presentation, participants should be able to:

- Discuss the definition of pain
- Discuss the definition of multi-modal analgesia
- Describe the different types of anesthetic choices for a cesarean delivery
- Describe the benefits of multi-modal therapy
- Describe common medications used for multi-modal analgesia following cesarean delivery
Pain

“An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” – International Association for the Study of Pain

Pain

▶ Common types:

▶ Nociceptive: stimulation of peripheral nerve receptors in response to thermal, mechanical or chemical injury
  
  ▶ Ex. Mechanical trauma from surgery (bone, muscle, visceral)

▶ Neuropathic: caused by disease or injury to any part of the somatosensory system
  
  ▶ Ex. Pins and needles associated with diabetic neuropathic pain (burning, tingling sensation)

▶ Other types include:

▶ Phantom, psychogenic, breakthrough, and incident

Pain Pathways

- Nociceptor input from chemoreceptors, mechanoreceptors, or thermal receptors
- First order neurons in the peripheral nervous system
- Second order neurons in the spinal cord
- Spinothalamic tract
  - To thalamus and then sensory cortex
- Spinoreticular tract
  - To reticular formation in brainstem and then cerebral cortex

Pain
Cesarean Delivery

- Most common indications include:
  - Failure to progress
  - Non-reassuring fetal status
  - Cephalopelvic disproportion
  - Malpresentation
  - Previous C-section

- Type of anesthesia depends on:
  - Urgency of the procedure
  - Condition of mother and fetus

Regional Anesthesia for Cesarean Delivery

- Spinal anesthesia
- Epidural anesthesia
- Combined spinal / epidural anesthesia (Coaxial)
Regional Anesthesia

- Spinal anesthetics block nerve roots within the subarachnoid space
  - “All or nothing” block
  - More profound motor blockade

- Epidural anesthetics
  - Catheter placed in epidural space between ligamentum flavum and dura mater
  - Allows for intermittent boluses and continuous infusions
  - Motor blockade can range from complete to none
    - Depends on choice of local anesthetic, concentration, dosage and level of injection

TRANSVERSUS ABDOMINIS PLANE BLOCK (TAP BLOCK)

- The transversus abdominis plane (TAP) is the location of this regional anesthetic technique.
- Local anesthetic is placed in the lateral abdominal wall in a plane between the internal oblique and the transversus abdominis muscles with the use of an ultrasound.
- TAP block provides sensory blockade of the abdominal wall, making it an ideal mode of post-operative analgesia for patients undergoing cesarean delivery and gynecologic surgery.
**TAP BLOCK**

**TAP Block Candidates**
- CSE Patients
- Any open abdominal procedures

**Non-Candidates**
- Labor epidural patients converted to cesarean delivery
  (risk for local anesthetic toxicity)
Multimodal Technique for Perioperative Pain Management

- Multimodal analgesia combines two or more analgesic agents or techniques that act by different mechanisms to provide analgesia

- American Society of Anesthesiologists (ASA) Task Force recommendations:
  - Unless contraindicated, all patients should receive an around-the-clock regimen of a non-opioid agent
    - Non-steroidal anti-inflammatory drugs (NSAIDs)
    - Cyclooxygenase-2 specific drugs (COXIBs)
    - Acetaminophen
  - Consider supplemental regional anesthesia techniques

Multimodal Approach to Acute Pain Management

**Step 1 – Most Post-Operative Pain**
- Non opioid analgesic: Acetaminophen, NSAIDs, or COX-2 Selective Inhibitors
- Local Anesthetic Infiltration

**Step 2 – Moderate Post-Operative Pain**
- Step 1 Strategy
- Intermittent Doses of Opioid Analgesics

**Step 3 – Severe Post-Operative Pain**
- Step 1 and Step 2 Strategies
- Local Anesthetic Peripheral Neural Blockade
- Use of Sustained Release Opioid Analgesics
Benefits of Multi-Modal Therapy

- Reduced doses of analgesics in the treatment plan
- Opioid dose-reducing effects
- Better pain relief is possible with a single analgesic, secondary to synergistic or additive effects of the various agents in the treatment plan
- Fewer “analgesic gaps”
- Less pain during rest and activity
- Improved functional outcomes
- Reduced LOS
- Improved patient satisfaction

Pain is complex and multifactorial; thus appropriate management requires a “balanced” therapeutic approach
Treatment Considerations for Implementing Multimodal Analgesia

- Base multimodal analgesia decision on:
  - Efficacy
  - Patient Characteristics
    - Age
    - Co-morbidities
    - Gastric motility
    - Organ dysfunction
    - Tolerability
  - Ease of use (around-the-clock vs. as-needed)
Multiple Organizations Recommend a Non-Opioid Foundation to Multi-Modal Analgesia

Society Recommendations

► American Society of Anesthesiologists (ASA)
► American Society of Pain Management Nursing (ASPMN)
► American Society of PeriAnesthesia Nurses (ASPN)
► American Geriatrics Society (AGS)
► Society of Critical Care Medicine (SCCM)

Accrediting and Quality Organizations

► The Joint Commission (TJC)
► Agency for Healthcare Research and Quality (AHRQ)
## Types of Non-Opioids Used in Multi-Modal Treatment Plans

<table>
<thead>
<tr>
<th>Acetaminophen</th>
<th>Alpha-2 agonists</th>
<th>Gabapentinoids</th>
</tr>
</thead>
<tbody>
<tr>
<td>acetaminophen</td>
<td>clonodine</td>
<td>gabapentin</td>
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<tr>
<td></td>
<td>dexmetetomidine</td>
<td>pregabalin</td>
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</table>

<table>
<thead>
<tr>
<th>Local Anesthetics</th>
<th>NMDA Receptor Antagonist</th>
<th>NSAIDs</th>
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<tbody>
<tr>
<td>bupivacaine</td>
<td>ketamine</td>
<td>celecoxib</td>
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<tr>
<td>lidocaine</td>
<td></td>
<td>ibuprofen</td>
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<tr>
<td>liposomal bupivacaine</td>
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<td>ketorolac</td>
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</table>
Example of Multi-Modal Approach Pain Regimen for an Elective Cesarean Delivery

- Spinal with LA + morphine, acetaminophen & ketorolac + TAP Block
  - OR
  - Combined Spinal Epidural, acetaminophen & Ketorolac + TAP Block
  - OR
  - General Anesthesia, acetaminophen & Ketorolac + TAP Block

- Acetaminophen Ketorolac opioids

PERIOPERATIVE PERIOD

POSTOPERATIVE PERIOD
Common medications used for multi-modal analgesia following cesarean delivery
Acetaminophen
(Ofirmev)

- Treatment of mild to moderate pain
- Reduction of adjunctive opioid analgesics for moderate to severe pain
- Mechanism of action:
  - Inhibits the synthesis of prostaglandins in the CNS
  - Blocks pain impulse generation peripherally
- IV infusion should be administered within 15 min
- May cause severe hepatotoxicity with overdose
- Minimal anti-inflammatory effects
- Fewer GI side effects than NSAIDS
- Patients not to exceed 4 grams/day

(Lexicomp 2013; Texas Children’s Hospital Formulary)
Toradol
(Ketorolac)

- Nonsteroidal Anti-inflammatory Drug (NSAID)
- Short term management of moderate to severe pain
- Mechanism of action:
  - Inhibits COX-1 and COX-2
    - Decreased formation of prostaglandin precursors
    - Inhibits chemotaxis -> decreases proinflammatory cytokine levels
- Primary reasons for withholding Toradol:
  - Incomplete hemostasis / high risk of bleeding
  - Renal impairment related to PIH or hypovolemia

(Lexicomp 2013; Texas Children's Hospital Formulary)
Nubain
(*Nalbuphine*)

- Opioid partial agonist, analgesic
- Relief of moderate to severe pain; prevention or treatment of opioid-induced pruritus
- Mechanism of action:
  - Kappa opiate receptor agonist
  - Mu opiate receptor partial antagonist
  - Inhibits ascending pain pathways
  - Alters the perception of and response to pain
- Primary side effect: Sedation

*(Lexicomp 2013; Texas Children’s Hospital Formulary)*
Epidural Duramorph

- Excellent method for postop pain management following abdominal surgeries
  - Preserved pulmonary function
  - Earlier ambulation → Lower risk for DVTs
- Redose: 2mg / Onset: 5-10 min / Peak: 20-30 min / Duration: 16 - 20 hours
- Nursing Consideration: Vital Signs post redose (30 mins x2, Q1H x2, Q4H x4)
- Side effect:
  - Serious: Dose-dependent, delayed respiratory depression
  - Common: Pruritis (itching), nausea, vomiting, dizziness

Anesthesia Order Sets

- Postoperative orders are provided for all patients after a C-section
  - Include previously discussed multimodal pain medications
  - Tailored to each patient depending on comorbidities
  - Reordered after an epidural Duramorph (Morphine) redose
Anesthesia Order Sets

### Vital Signs

- **Vital Signs/Monitoring**
  - Vital Signs
    - Routine, UNTIL SPECIFIED First occurrence Today at 11:15 for 24 hours
    - Every 30 minutes × 2, then Every 1 hour × 2, then Every 4 hrs × 4.
  - Assess Level of Sedation
    - Routine, UNTIL SPECIFIED First occurrence Today at 11:15 for 24 hours
    - Every 30 minutes × 2, then Every 1 hour × 2, then Every 4 hrs × 4.
  - Assess Sensory Motor Changes
    - Routine, UNTIL SPECIFIED First occurrence Today at 11:15 for 24 hours
    - Every 30 minutes × 2, then Every 1 hour × 2, then Every 4 hrs × 4.
  - If patient receives an additional dose on POD 1 - repeat vital signs, level of sedation, and sensory motor change assessments
    - Routine, UNTIL SPECIFIED First occurrence Today at 11:15 for 24 hours
    - Every 15 minutes × 2 hrs, then Every 30 minutes × 1 hour, then Every 1 hour × 2, then Every 4 hrs for the duration of the infusion or until 24 hrs after the last dose of spinal/epidural narcotic.
  - Nursing: Refer to the Anesthesia orders for pain management options
    - Routine, UNTIL SPECIFIED First occurrence Today at 11:15 for 24 hours

### Nursing

- **Notify Practitioner**
  - Notify Anesthesiologist for a temperature greater than 101.5°F if epidural catheter in place
    - Routine, UNTIL SPECIFIED First occurrence Today at 11:15 for 24 hours
  - Notify Anesthesiologist
    - Routine, UNTIL SPECIFIED First occurrence Today at 11:15 for 24 hours
    - For inadequate analgesia, excessive sedation, respiratory rate less than 10/min and PRIOR to administration of any systemic narcotics, analgesics, sedatives, anticoagulants, hypnotics, antiemetics, or tranquilizers, unless ordered by GHA Pain Service.
Anesthesia Order Sets

- **Respiratory**
  - Check Pulse Oximetry on arrival to unit and every 4 hrs x 24 hrs
  - Continuous Pulse Oximetry for 24 hours
  - Administer Oxygen per Nasal Cannula for 24 hours

- **Pain Medications**
  - **Epidural (PCEA)**
    - Bupivacaine/epinephrine: 0.1%-5 mcg/mL (PCEA)
      - Continuous Infusion Rate (mL/hr): 6
      - Interval Dose (mL): 2
      - Lockout interval (minutes): 15 minutes
      - 1-Hour Limit (mL): 14
      - Epidural, CONTINUOUS starting Today at 1130 until Tomorrow at 1126
      - Use “YELLOW” strip extension set.
  - **Supplemental Analgesia for Neuraxial Narcotic**
    - Ketorolac Injection 30 mg/mL
      - 30 mg, Intravenous, EVERY 6 HOURS PRN for 24 hours, pain, Unless ordered by OB
  - **Breakthrough Pain**
    - Select one only:
      - Nalbuphine (NUBAIN) Injection
        - 2 mg, EVERY 2 HOURS PRN for 24 hours, pain, Do not exceed 4 mg in 4 hours. Draw up dose immediately prior to use, Discard unused portion immediately.
      - Butorphanol (STadol) Injection 1 mg/mL
        - 2 mg, Intravenous, EVERY 4 HOURS PRN for 24 hours, breakthrough pain
# Anesthesia Order Sets

<table>
<thead>
<tr>
<th>IV Tylenol for patients weighing less than 50 kg</th>
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<tbody>
<tr>
<td>✔  acetaminophen Injection 10 mg/mL (Maximum dose = 750 mg)</td>
</tr>
<tr>
<td>15 mg/kg, Intravenous, EVERY 6 HOURS for 3 doses</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>IV Tylenol for patients weighing greater than or equal to 50 kg</th>
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<tbody>
<tr>
<td>✔  acetaminophen Injection 10 mg/mL</td>
</tr>
<tr>
<td>1,000 mg, Intravenous, EVERY 6 HOURS for 3 doses</td>
</tr>
</tbody>
</table>

## Management of Side Effects

### Narcotic Reversal
- ✔ naloxone Injection 0.4 mg/mL 
  - 0.2 mg
  - Intravenous Push, ONCE PRN starting Today at 1101 until Tomorrow at 1100, respiratory depression, May repeat dose in 5 minutes x 1
  - For 2 doses only. Administer if respiratory rate less than 10/min, patient obtunded or un-arousable and call the Anesthesiologist STAT. May be given IVP over 30 seconds.

### Management of Pruritis
- ✔ diphenhydrAMINE (BENADRYL) Injection 50 mg/mL 
  - 25 mg, Intravenous, EVERY 4 HOURS PRN for 24 hours, itching
- ✔ nalbuphine (NUBAIN) Injection 
  - 2 mg, Intravenous, ONCE PRN for 24 hours, pain, May give in addition to breakthrough pain nalbuphine dose(s). Draw up immediately prior to use. Discard unused portion immediately.
- ✔ butorphanol (STADOL) Injection 1 mg/mL 
  - 2 mg, Intravenous, ONCE PRN for 24 hours, itching, May give in addition to breakthrough pain dose of butorphanol.

### Management of Nausea
- ✔ ondansetron (ZOFRAN) Injection 2 mg/mL 
  - 4 mg, Intravenous, for 2 Minutes, EVERY 6 HOURS PRN for 24 hours, nausea
- ✔ promethazine Injection
Multi-modal postoperative pain regimen is important

Patient satisfaction is paramount

We all work as a team

Anesthesia providers available 24 hours a day to help with questions or unique issues
SO ... DO YOU HAVE ANY QUESTIONS FOR ME?

Thank You!