Pain Management for Labour and Delivery

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Existence of Labour Pain

- The existence of chronic pain, which often lacks an obvious outward cause, is now unquestioned
- The existence of labour pain, which is accompanied by visible tissue injury, is often denied

Anatomic Basis of Pain

- **1st Stage of Labour:**
  - Cervix and lower uterine segment
  - Requires block of T10-L1 dermatomes
**Anatomic Basis of Pain**

- **1\(^{st}\) Stage of Labour:**
  - Cervix and lower uterine segment
  - Requires block of T10-L1 dermatomes
- **2\(^{nd}\) Stage of Labour:**
  - Vaginal surface of cervix, vagina, perineum

**Effects of Pain on the Mother**

- **Pain**
  - Increases SNS activity – increasing catecholamines
- **Analgesia**
  - Decreases epinephrine and its B-adrenergic tocolytic effect on the myometrium
  - May convert dysfunctional labour into functional labour

**Cardiac and Respiratory Effects**

- Labour stresses both systems
- Increased catecholamines
  - Increase in C.O. and SVR
  - Decreased uteroplacental perfusion
- Intermittent pain
  - Stimulates respiration
  - Periods of intermittent hyperventilation
  - Increased oxygen consumption
- Effective analgesia
  - ~50% decrease in catecholamines

**Forms of OB Analgesia and Anesthesia**

1) Nonpharmacologic
   1) Childbirth education and Lamaze
   2) Emotional support (husband, friend, doula)
   3) Touch and massage
   4) Therapeutic heat and cold
   5) Hydrotherapy
   6) Upright position
   7) TENS
   8) Acupuncture/ acupressure
   9) Hypnosis
2) Systemic Analgesia – Opioids

- **Maternal Risks:**
  - Nausea, vomiting, delayed gastric emptying, dysphoria, hypoventilation, hypoxemia

- **Fetal Risks:**
  - Lipid soluble and low molecular weight – therefore will cross placenta
  - Risks of neonatal respiratory depression, ? Neurobehavioural changes, decreased FHR variability

- **Routes of administration:**
  - IM/SC – variable onset, quality, duration
  - IV – faster onset, predictable levels, titratable
  - PCA – potential advantages:
    - Superior pain relief with lower doses
    - Less maternal respiratory depression
    - Less placental transfer
    - Less need for antiemetics
    - Improved patient satisfaction

- **Doses:**
  - Demerol: 50-100 mg IM or 25-50 mg IV q 2-4 hrs
  - Morphine: 5-10 mg IM or 2-5 mg IV q 3-4 hrs
  - Remifentanil PCA: basal plus 0.25 ug/kg bolus q 2-5 minutes

2) Systemic Analgesia – Inhalational Agents:

- **Nitrous Oxide**
  - Entonox = 50% nitrous and 50% oxygen
  - Efficacy questionable (30-40% of mothers report little to no benefit)
  - Must breathe the entonox from the very beginning to the very end of the contraction
  - Potential maternal hypoxia with additive effects with opioids
  - Environmental pollution

2) Systemic Analgesia – Inhalational Agents:

- **Volatile agents:**
  - 0.5% MAC volatile is at least as effective as 50% nitrous mixtures

- **Risks:**
  - Maternal sedation
  - Maternal amnesia
  - Hypoventilation
  - Loss of protective airway reflexes – pulmonary aspiration

3) Regional Techniques:
Forms of OB Analgesia and Anaesthesia

3) Regional Techniques:
   - Epidural
   - Spinal
   - Combined spinal epidural

Epidural Analgesia – Indications:
- ACOG and ASA have stated: “in the absence of a medical contraindication, maternal request is a sufficient medical indication for pain relief during labour”

Epidural Analgesia – Indications:
- Epidural analgesia is appropriate for the pain of even early labour
- There is NO minimum cervical dilation required before the administration of epidural analgesia

Epidural Analgesia May Facilitate:
- Atraumatic vaginal breech delivery
- Vaginal delivery of twin infants
- Facilitates the control of BP in pre-eclamptic women

Epidural Analgesia May Facilitate:
- Blunts hemodynamic effects of uterine contractions
  - Increased preload, tachycardia, increased SVR, hypertension, hyperventilation
  - Of concern in patients with other medical complications (eg. Mitral stenosis, intracranial disease, asthma)

Epidural and Spinal Analgesia - Contraindications
Epidural and Spinal Analgesia - Contraindications

- Patient refusal or inability to cooperate
- Increased ICP secondary to a mass lesion
- Skin or soft tissue infection at the site of needle placement
- Frank coagulopathy
- Uncorrected maternal hypovolemia (e.g., Hemorrhage)
- Inadequate training in or experience with the technique

Epidural and Spinal Analgesia - Contraindications

- What WBC is ok?
- What platelet count is ok?

Complications of Epidural Analgesia:

- Hypotension:
  - Sympathetic blockade – peripheral vasodilation – decreased venous return – decreased BP and CO
  - Prevention:
    - Volume expansion
    - Avoid aortocaval compression

Complications of Epidural Analgesia:

- Failure:
  - Patient factors:
    - Obesity
    - Abnormal lumbar spine anatomy
    - Depth of epidural space
  - Complete, patchy, one-sided
  - 1.5 – 5%
### Complications of Epidural Analgesia:

- **Intravascular Injection of Local:**
  - CNS symptoms:
    - Restlessness, dizziness, tinnitus, perioral numbness, difficulty speaking, seizures, loss of consciousness
  - CVS:
    - Bradycardia, hypotension, ventricular tachycardia, ventricular fibrillation
    - Bupivacaine - cardiotoxic

- **Dural Puncture:**
  - ~1 % risk in experienced hands
  - Options:
    - Replace catheter at another space, or intrathecal catheter

- **Unexpected High Block:**
  - 1:1400 to 1:4500
  - Importance of test dose
  - Potential respiratory and cardiovascular collapse

- **Extensive Motor Block:**
  - Bothersome for patient
  - May impair maternal expulsive efforts
  - Increases likelihood of mother assuming unnatural position – may increase risk of postpartum back pain
  - Dilute local anesthetics to prevent this
  - PCEA
Complications of Epidural Analgesia:

- Urinary Retention
  - Often require urinary catheters

- Epidural Hematoma
  - 1 per 220,000 for spinals
  - 1 per 150,000 for epidurals

- Epidural Abscess
  - 0.2 to 3.7 per 100,000

- Back Pain:
  - Often results from exaggerated lumbar lordosis of pregnancy
  - No significant relationship between the use of epidural analgesia and long-term backache

- Peripheral nerve injury
  - 3.5 per 10,000
  - The majority resolve within 3 months

- Paraplegia
  - 1:250,000

- Prolongation of labour
  - 2nd stage – approx. 30 minutes

- Increased incidence of c-section
  - Varying results
  - Consensus is: No
  - Instrumental delivery: up to 25% increased risk
Options for Anesthesia for C-Section:

1) Epidural
   • Usually a "top-up"
   • Often not as complete pain relief as a spinal
   • Takes time
   • Ability to give more local anesthetic if procedure lengthy

2) Spinal
   • Single shot
   • Rapid
   • Usually dense block
   • No opportunity to "top up"

3) General Anesthetic
   • Increased risks due to physiologic changes of pregnancy
   • Fastest option in an emergency
   • Controlled airway in cases of potential bleeding (e.g., complete placenta previa)
   • Least commonly used

Anesthetic Implications of Maternal Physiologic Changes during General Anesthesia

- Endotracheal Intubation
  - Smaller endotracheal tube required
  - Increased risk of trauma
  - Increased risk of failed intubation
  - Increased risk of pulmonary aspiration of gastric contents

- Maternal oxygenation
  - Increased physiologic shunt when supine
  - Increased rate of denitrogenation (decreased FRC)
  - Increased rate of desaturation during apnea (decreased FRC and increased oxygen consumption)
Anesthetic Implications of Maternal Physiologic Changes during General Anesthesia

- Maternal ventilation
  - Increased minute ventilation required

Aspiration:

- ~ 3x increased risk in pregnancy
- Mechanisms:
  1) Increased progesterone production:
     1. Decreased gastrointestinal motility
     2. Slower absorption of food
     3. Gastric secretions are more acidic
     4. Lower esophageal sphincter tone is decreased

Aspiration:

- ~ 3x increased risk in pregnancy
- Mechanisms:
  2) Uterine growth
     - Upward displacement and rotation of stomach
     - Increased pressure and delay in gastric emptying

Aspiration:

- ~ 3x increased risk in pregnancy
- Mechanisms:
  3) Pain, anxiety, and opioids may further exacerbate this delay

Preventing Aspiration:

1) Avoidance of GA
2) Performance of awake intubation in a patient with a difficult airway
3) Application of cricoid pressure, rapid sequence induction, and intubation with a cuffed ETT
4) Confirm full return of neuromuscular function and only extubate when fully awake and responding to verbal commands

Preventing Aspiration:

5) Pharmacologic therapy:
   1) Non-particulate antacid – sodium citrate
   2) Metoclopramide
      1. Accelerates gastric emptying
      2. Increases lower esophageal sphincter tone
      3. Antiemetic effects
   3) H₂ – receptor antagonist
      - Increases gastric pH
      - Eg. Ranitidine 50 mg IV 30 mins pre-op
### Preparation for Analgesia

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<th><strong>Maternal History:</strong></th>
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<td>Eg. Resp or cardiac disease, neurologic disorders, bleeding disorders, etc.</td>
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<tr>
<th><strong>Obstetrical History:</strong></th>
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<td>Multiple gestation, pre-eclampsia, GDM, previa</td>
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<th><strong>NPO status</strong></th>
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<td>Vitals, including FHR</td>
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<td>Airway exam (can change throughout labour)</td>
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<td>CVS</td>
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<td>Resp</td>
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<td>Back exam (infections, scoliosis, tattoos)</td>
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<td>Additional tests based on history</td>
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### Preparation for Analgesia

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