Initiation and Maintenance of Labour Analgesia: Epidural or CSE, Bolus or Infusion?

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A brief history.....

Genesis 3:16

- God said to Eve

  “I will make your pains in childbearing very severe; with painful labour you will give birth to children”

- >1800 years religious opposition to labour analgesia
Journey of analgesia in obstetrics:

- 19th century increased use of chloroform and ether
- Various techniques for obstetric regional analgesia (RA) described 1900-1930
  - Continuous RA (caudal) – Hingson and Edwards, 1943
- 1950s-present: Lumbar epidural and Combined spinal-epidural (CSE)
Modern Labour Analgesia:

- *When?*
- *How?*
- *With what?*
Initiation of RA for labour: when?

- Increased CS rate with early initiation
- >1200 women randomised to receive epidural analgesia at 1 or 4 cm dilatation
- No effect on progress or outcome of labour
- RA should be established at maternal request including in latent phase

Initiation of labour analgesia: How? With what?

- **Lumbar epidural:**
  - 20 mls x 0.1% plain bupivacaine + 40 mcg fentanyl

- **Combined spinal-epidural (CSE):**
  - needle-through-needle / separate space
  - Intrathecal plain bupivacaine 2.5 mg + 5-25 mcg fentanyl
Common indications for CSE:

- Severe maternal distress regardless of cervical dilatation
- Rapid analgesia in late first stage and second stage of labour
- Anaesthesia for delivery (2\textsuperscript{nd} stage)
- Anaesthesia for artificial rupture of membranes (ARM)
- Multiparae in established labour
- Previous suboptimal analgesia with lumbar epidural
- Difficult back
Disadvantages of CSE for labour analgesia?

- No evidence for increased risk of infection with scrupulous asepsis
- CSE no higher than L3/4 interspace to avoid neurotrauma
- No increase in PDPH with CSE
FHR abnormalities and intrathecal opioids:

- CSE – sudden drop in pain level => decrease adrenaline and β-endorphin
- No decrease noradrenaline or oxytocin
- Vasoconstriction and uterine hypertony
- Additional central effect
- Dose dependent effect
- No effect on maternal and neonatal morbidity
- Avoid when fetal distress or uterine hypertony present prior to labour analgesia
Disadvantages of CSE for labour analgesia

- Intrathecal opioid – increased pruritus
- Dose dependent effect
Initiation of labour analgesia: CSE or epidural?

- “No conclusive evidence to recommend one technique over another…”

Maintenance of Labour Analgesia: Low dose mixtures

- 1970s: use of low concentration LA in large volumes
- 1980s: addition of opioid prolonged duration and improved quality of analgesia
- Minimal motor block
- No effect on progress of labour
Maintenance of labour analgesia: Choice of Local Anaesthetic

- Bupivacaine vs levobupivacaine vs ropivacaine
- MLAC Bupivacaine > levobupivacaine /ropivacaine
- Greater safety of single enantiomers
- Choice of LA does not appear to affect outcome of labour

Maintenance of labour analgesia: the ideal technique

- Continuous, uninterrupted and safe analgesia
- Titration of dose to progress of labour and pain
- Allow maternal ambulation
- Allow effective pushing in 2nd stage
- No breakthrough pain
- Decrease total anaesthetic dose
- Decrease physician workload
Techniques available:

- “Interrupted”
  - Manual top ups (midwife/anaesthetist)
  - Patient controlled epidural analgesia (PCEA)

- “Continuous”
  - Continuous epidural infusion (CEI)
  - PCEA with background infusion
  - Automated Mandatory Boluses (AMB)/ Programmed Intermittent Boluses (PIB)
  - Computer integrated PCEA (CI-PCEA)
### Intermittent epidural bolus (midwife top-up):

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
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<tr>
<td>Titrate dose and volume to progress of labour and severity of pain in individual</td>
<td>Midwife involved</td>
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<tr>
<td>Less frequent motor block</td>
<td>Pain free intervals only</td>
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<tr>
<td>Less LA consumption</td>
<td>Time to re-establish analgesia</td>
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<td>Delay in receiving top up if clinician delivered</td>
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<td>Increased workload</td>
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PCEA:

Pros:
- Autonomy
- Titratability
- Reduced workload
- Safe

Cons:
- ?Ideal bolus/lockout regimen
- Patient experiences intermittent pain
- Maternal cultural/psychological factors and expectations
- Technical problems with pumps
Continuous Epidural Infusion (CEI):

**Advantages**
- True continuous pain relief
- Can be individualised and titrated
- Avoids block regression
- More CVS stability

**Disadvantages**
- “Automatic pilot”
- Breakthrough pain
- Increased motor block
- Increased urinary catheterisation
- Increased LA consumption
Maintenance of labour analgesia: Continuous infusion vs intermittent (top-up)

Spread dependent on:

- Volume of injectate
- Speed of injection
- Pressure applied
- Single or multiport catheter
PCEA plus background infusion:

**Pros:**
- > 5 ml/hr Basal infusion better
- Decreased breakthrough pain
- -> decreased workload

**Cons:**
- Increased LA consumption
- Increased motor block
- No clear evidence of improvement in maternal analgesia and satisfaction
PCEA plus AMB: Double pump system

**AMB:**
- Variant of PCEA+CEI
- Infusion dose given as bolus at set intervals
- Decreased need for self boluses
- Decreased motor block
- Decreased instrumental delivery
PCEA + PIB: “Smartpumps”

The “Smartpump”

- Fixed preprogrammed epidural bolus at regular intervals with PCEA/clinician bolus for breakthrough pain

- Lockout time between PIB/PCEA bolus

- Single drug mixture only
Computer-integrated PCEA (CI-PCEA):

- Software programme and pump in development based on new clinical algorithm

- Target is to adjust background infusion rate according to frequency of earlier demands

- Matches basal infusion rate to patient’s analgesic needs
My conclusions: CSE or epidural?

*Depends on:*

- Mother’s needs
- Safety of mother and baby
- Expertise within the unit
Bolus or infusion:

- Dependent on logistics
- Bolus – midwife or PCEA
- 8-10 ml LDM every 15-20 minutes
- Further research to achieve ideal
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