Maternal & fetal outcomes after regional labour analgesia

Ultra low dose epidurals to BUMPES

Dr Bernard J Norman
November 2012
The Birth of Queen Victoria’s Eighth Child, Prince Leopold, 1853

“Dr Snow gave that blessed chloroform and the effect was soothing, quieting, and delightful beyond measure”
Mother – major complications

“Pessimistic interpretation: Incidence of permanent harm following obstetric epidural is 1 in 161,550”

- 1 abscess
- 1 haematoma
- 2 nerve injuries

Complications much less common in obstetric patients

- Inadvertent dural puncture
- Nerve injury (but usually obstetric or spinal related)
  1 in 6,700 or 250,000
- Spinal haematoma or abscess
  1 in 150,000
- Meningitis (spinal)
  1.5 in 10,000
- Total spinal almost impossible with low dose solutions
- Drug errors (but...)

NAP 3

Major complications of central neuraxial block in the United Kingdom

The 3rd National Audit Project of The Royal College of Anaesthetists

Report and findings January 2009
Epidural versus non-epidural analgesia or no analgesia in labour
2005
• 17 trials, 6162 women
• Increased risk of instrumental delivery
• RR 1.38 (1 in 10 consequential ID)

Increase risk of oxytocin – RR 1.18
Prolong 2\textsuperscript{nd} stage by 15 minutes
Hypotension

No increase in 1\textsuperscript{st} stage duration, CS rate or long-term backache
Sea squirt, *ciona intestinalis*
Sea squirt, *ciona intestinalis*

Anaesthetic Trainee

1998

Anaesthetic Consultant
Sea squirt, *ciona intestinalis*

Anaesthetic Trainee

1998

Anaesthetic Consultant
Mother – instrumental delivery - low dose

COMET 2001

Traditional

LD CSE

LD Infusion

5% High level Resuscitation (1% in other groups) p=0.02

3% had 5 min Apgar <8 (Traditional 1.5%) p=0.09

NVD
Instrumental
Caesarean
Mother – instrumental delivery - low dose

Sultan et al 2012

**Figure 2: Forest plot for the primary outcome of assisted vaginal delivery (AVD)**

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Low Concentration</th>
<th>High Concentration</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Total</td>
<td>Events</td>
<td>Total</td>
</tr>
<tr>
<td>Atienza 2004</td>
<td>19</td>
<td>38</td>
<td>20</td>
<td>39</td>
</tr>
<tr>
<td>Benhamou 2002</td>
<td>21</td>
<td>35</td>
<td>16</td>
<td>23</td>
</tr>
<tr>
<td>COMET 2001</td>
<td>200</td>
<td>701</td>
<td>131</td>
<td>353</td>
</tr>
<tr>
<td>Dahl 1999</td>
<td>4</td>
<td>46</td>
<td>7</td>
<td>45</td>
</tr>
<tr>
<td>Ginosar 2010</td>
<td>12</td>
<td>43</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>Gogarten 2004</td>
<td>22</td>
<td>103</td>
<td>39</td>
<td>206</td>
</tr>
<tr>
<td>James 1998</td>
<td>2</td>
<td>35</td>
<td>9</td>
<td>38</td>
</tr>
<tr>
<td>Khan 2004</td>
<td>0</td>
<td>25</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Kumar 2009</td>
<td>1</td>
<td>30</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Lee 2002</td>
<td>10</td>
<td>39</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Naranyan 2009</td>
<td>1</td>
<td>50</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>1145</strong></td>
<td></td>
<td><strong>852</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total events</strong></td>
<td>292</td>
<td></td>
<td>249</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.00; Chi² = 9.67, df = 10 (P = 0.47); I² = 0%
Test for overall effect: Z = 3.32 (P = 0.0009)

Favours low conc  Favours high conc
Figure 2: Forest plot for the primary outcome of assisted vaginal delivery (AVD)

- Low Conc. = 0.0625% bupivacaine, or 0.1% ropivacaine, plus opioid
Mother – variants on a theme

Loubert et al 2011

Ultra-low dose

• Sultan et al – instrumental delivery reduced
• Analgesia, PONV, puritis, all unchanged

CSE v epidural

• Motor block & hypotension – studies conflicting
• PDPH – studies underpowered, but probably ok with 27G
• Spinal opiates – fetal bradycardia

Dural puncture epidural technique

• Only effective with 25G, not 27G, creating headache risk

PCEA, bolus, etc

• Thank you Dr Teoh

Adding neostigmine / clonidine to ULD to reduce opiates

• Opiate sparing, less than 1000 pts, jury out for mothers (and babies)
Mother – temperature

? Decreased sweating / increased shivering
? Inflammatory response (cytokines raised, decreased by steroids)
Paracetamol ineffective
Fetus
Fetus – temperature

Lieberman et al 2000

Camann et al 19991

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**Fig. 2.** Mean (±SE) tympanic temperature in opioid (■) and no opioid (○) groups. P < 0.01: **compared with pre-oxygenation period (pret)."**

**Table:**

<table>
<thead>
<tr>
<th></th>
<th>Pyrexia</th>
<th>No pyrexia</th>
</tr>
</thead>
<tbody>
<tr>
<td>% 1 min Apgar score &lt;7</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td>% Hypotonia</td>
<td>5</td>
<td>0.5</td>
</tr>
<tr>
<td>% Oxygen therapy</td>
<td>8.2</td>
<td>1.3</td>
</tr>
<tr>
<td>% Neonatal seizures</td>
<td>3.3</td>
<td>0.2</td>
</tr>
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FIGURE 1
Occurrence of neonatal outcomes according to maximum intrapartum temperature among women who used epidural analgesia.
Fetus - overview

Meta-analysis comparing outcomes for epidurals (mainly LD with opioids) with parenteral opioids

Leighton & Halpern 2002

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<td>15%</td>
<td>15%</td>
<td>NS</td>
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<tr>
<td>1min Apgar &lt;7</td>
<td>4%</td>
<td>8%</td>
<td>&lt;0.05</td>
</tr>
<tr>
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<td>0.6%</td>
<td>1.2%</td>
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</tr>
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<td>17%</td>
<td>NS</td>
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Fetus – CTG abnormalities

Epidurals cause:
• ? Loss of short-term variability
• ? Decelerations
• ? Major bradycardias

May be some short term effects due to drop in adrenaline levels (adrenaline is a tocolytic)

But epidurals don’t seem to change overall incidence of CTG abnormalities in labour
Fetus – CSEs and CTG abnormalities

Loubert et al, Anaesthesia 2011

• More FHR abnormalities after CSEs than epidurals
• CSE is an independent predictor of uterine hypertonus
• A meta-analysis suggested spinal opioids responsible
• Is it because their analgesic effect reduces plasma adrenaline?
• No! Cos the initial analgesia is no better with spinal opiates
• Whatever the mechanism, avoid spinal opiates in CSEs
• In any case why would you want to use them?
  – Low dose spinal LA alone (2.5mg bupivacaine) provides good initial analgesia
  – Saves drawing up a controlled drug
  – And so reduces the wait for analgesia - (almost) the whole point of a CSE for labour
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Fetus – Apgar score

The better Apgar scores with epidural is probably only a pethidine sparing effect.

Mother – instrumental delivery - low dose

COMET 2001

Traditional: NVD 35, Instrumental 37, Caesarean 28
LD CSE: NVD 43, Instrumental 29, Caesarean 28
LD Infusion: NVD 43, Instrumental 28, Caesarean 29

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Fetus – beneficial effects of epidural on fetal pH

Epidurals:

- Reduced maternal stress hormones
  - and so reduced maternal and fetal metabolic acidosis
- Reduced hyperventilation
  - and so reduced uterine artery vasoconstriction
- Better umbilical artery pH
  - probably independent of not having pethidine

**REFERENCES**

Anesthesiology
2005; 102, Supp 1

**REVIEW 1**

SOAP A-40
Epidural Analgesia has a Favorable Effect on Funic Base Excess Compared to No Analgesia During Labor
M. Schocket, R. Garrison, J. Wiley, S. Sharma;
University of Texas Southwestern Medical Center, Dallas, TX.

**Introduction:** Severe pain during labor may produce maternal hyperventilation, respiratory alkalosis, and an increase in catecholamine levels which in turn may cause uterine vasoconstriction and reduction in oxygen delivery to the fetus.
“…the newborn is not destined to suffer as a result of neuroaxial analgesia in labour”

- Oxytocin infusion, instrumental delivery and maternal hypotension are not surrogates for neonatal outcome
- Beneficial effects of epidurals on fetal pH are overlooked
- Neonatal outcome depends on the balance of these opposing forces
Baby - breastfeeding

“Epidurals hamper breastfeeding” BBC News
“Epidural drug turns babies off breastfeeding” Sunday Times
“Epidurals lead to breast feeding troubles” Times
Wilson et al 2010
- Large, prospective, randomised
- Epidural +/- fentanyl +/- CSE
- Non-epidural +/- pethidine comparisons
- Only pethidine affected breast-feeding

Loubert et al 2011
- “…epidural labour analgesia and neuroaxial fentanyl do not significantly affect breastfeeding.”
Confounding variables
- Un-randomized
- Observational
- Retrospective
- Small

Wilson et al 2010
- Large, prospective, randomised
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Loubert et al 2011
- “…epidural labour analgesia and neuroaxial fentanyl do not significantly affect breastfeeding.”
Birth in Upright Maternal Position with Epidural in second Stage

• As compared to “lying”
• Maternal and fetal outcome
• Multicenter in UK (currently 10)
• Looking to recruit 3000 patients
Synopsis

**Figure 1**
Occurrence of neonatal outcomes according to maximum intrapartum temperature among women who used epidural analgesia.
References

- 3rd National Audit Project of the RCA: Major complications of central neuraxial block in the UK. 2009, www.rcoa.ac.uk
- Anim-Somuah et al. Epidural versus non-epidural or no analgesia in labour. Cochrane Database 2005
- Schocket et al. Epidural analgesia has a favorable effect on funic base excess compared to no analgesia during labor. Anaesthesiology 2005, 102:A40
- BUMPES trial. www.ucl.ac.uk/ctu/researchareas/womenshealth/bumpes