Pain relief during second stage of labour

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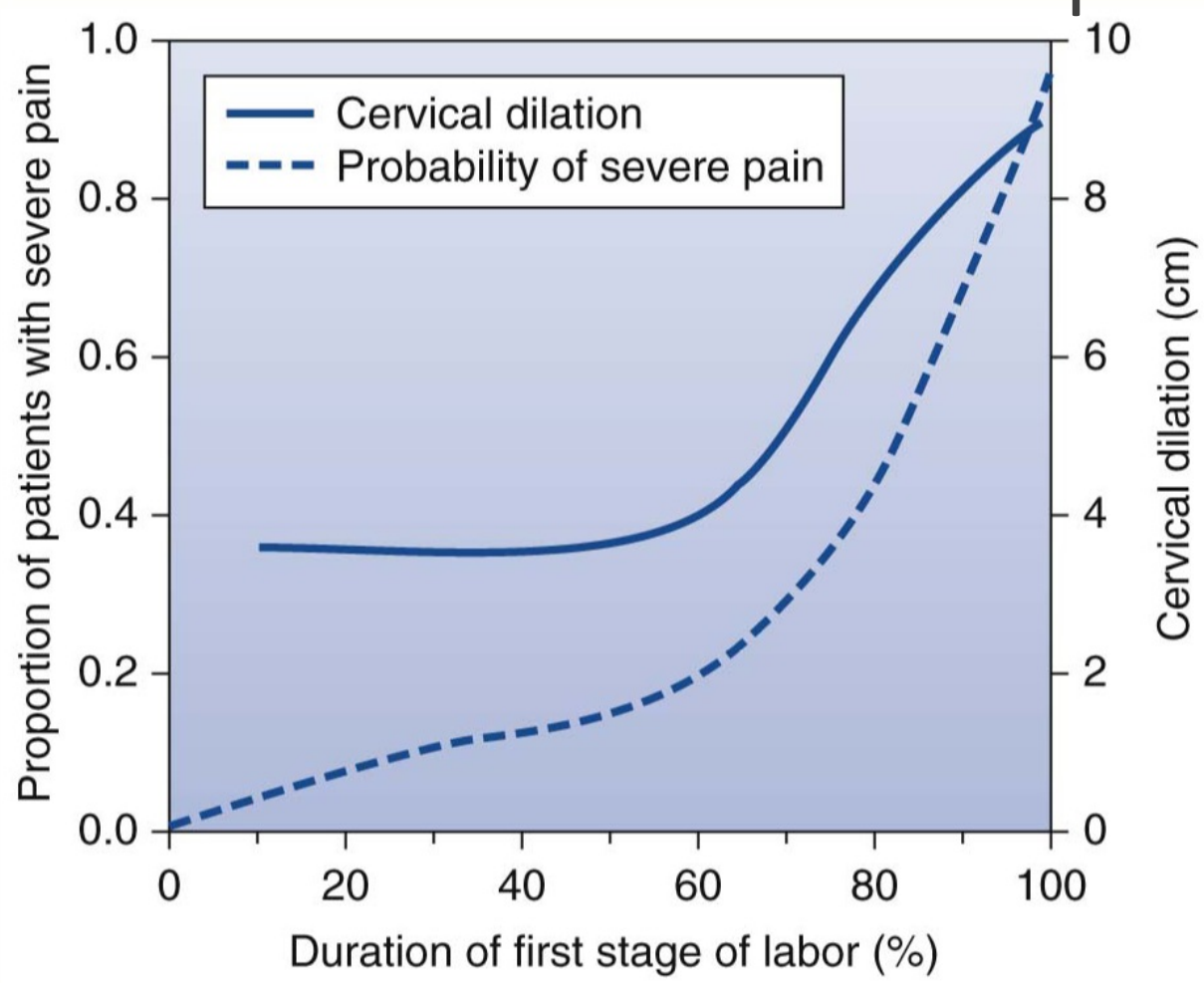
COPENHAGEN

Likelihood of severe pain during labor

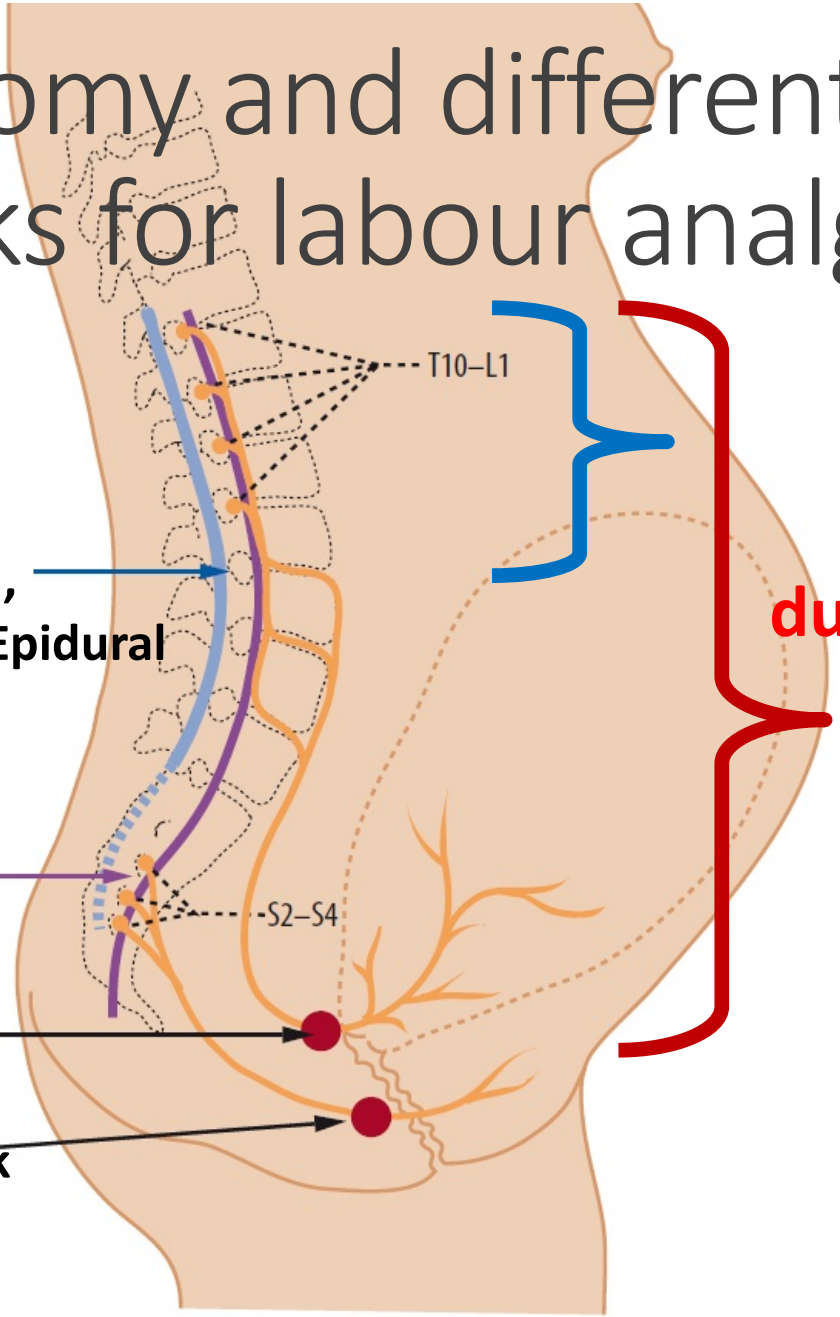


Delivery pain in two University hospitals in Finland (n = 2532) 2005[2]: median of worst pain

- during first stage of delivery 8
- during second stage 8

1. Chestnut's Obstetric anesthesia Principles and Practice 5th E.
2. Sarvela J. Finnish Medical Journal 7/2005.
3.

Neuroanatomy and different choices of blocks for labour analgesia



Lumbar Epidural,
Dural Puncture Epidural

Spinal or Combined
Spinal-Epidural (CSE)

Paracervical block

Pudendal block

during first stage of labour
- Th10-L1

during second stage of labour
- Th10-L1 &
- S2-4

Factors affecting outcome and pain

Parturient

- Primiparous vs multiparous women
- Severe pain - associated directly to increased operative delivery[1]
- Anatomy, height, weight, age and psychological reserves…

Pregnancy & Fetal related problems

Obstetrical management of labor

- Regional analgesia
- Cooperation
- Recumbent (vs upright) positioning during SSL resulted in more spontaneous deliveries in nulliparous women [2]
- Obstetric provider, management of dystocia, early vs delayed pushing[3]

The role of midwives during SSL

1. Alexander J. Anest Analg 2001;92:1524-8.
2. Bumpes study. BMJ 2017; 359:j4471
3. Cahill A. JAMA 2018; 320:14: 1444-54

Epidural analgesia & SSL

Speed of analgesia onset

- Slower onset when inserted late in labour
- MLAC of local anesthetics higher with progression of labour[1]

Sacral spread: Initially sacral sparing[2]

- L1/2 vs L 4/5 with lower positioning better extension of epidural analgesia to sacral dermatomes[3]
- Bolus vs continuous infusion dosing

Urge to push

- Better preserved with epidural than with spinal analgesia
- Especially important with primiparous women

1. Capogna. Br J Anaesth. 80:11-13 1998
2. LeCoq. Canadian J Anaesth 1998
3. Moore A. Anesth Analg 2017;125:1959-74.

Epidural analgesia vs. no epidural & Labour outcome

No increase in Ceasarean section (CS) rates

Cochrane meta-analysis 2018 [1]

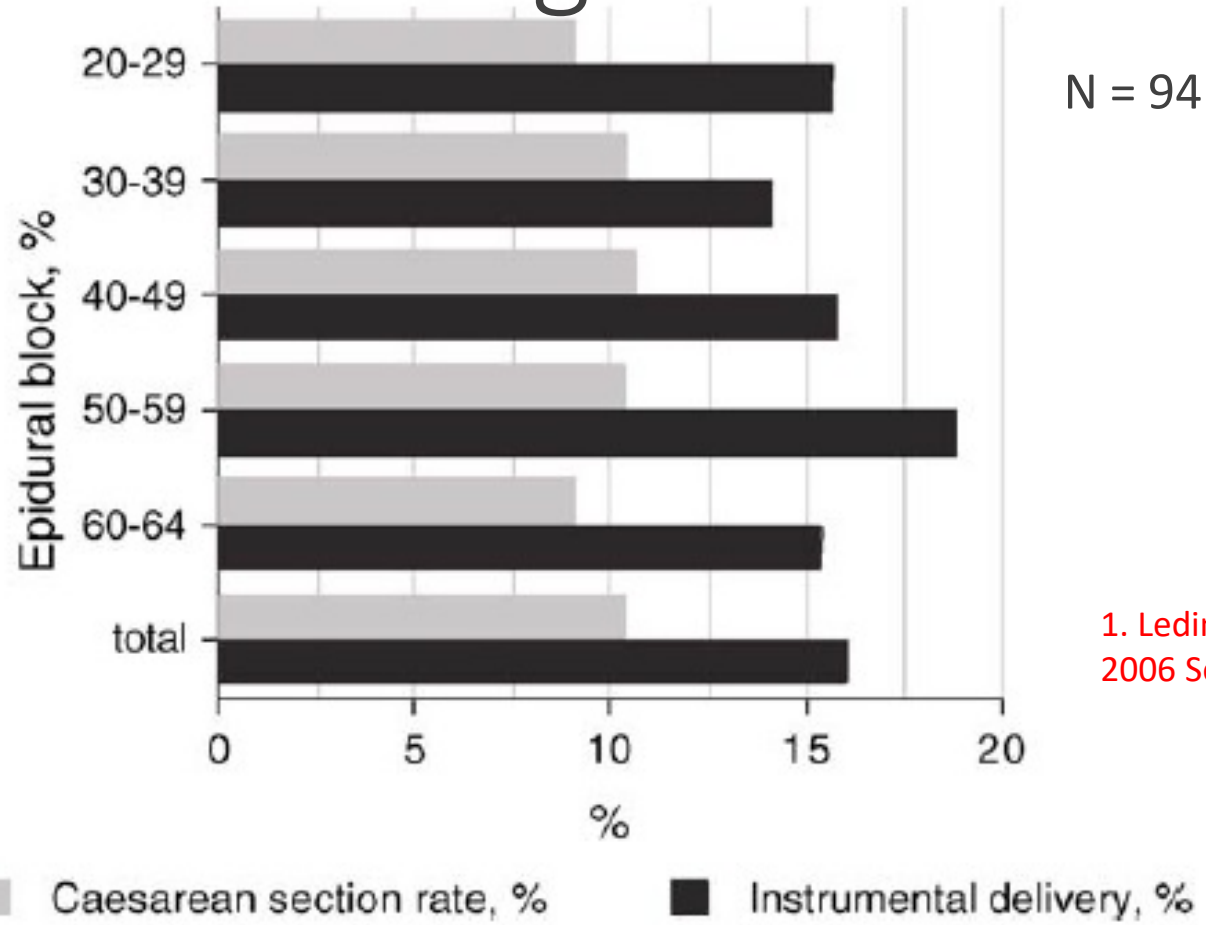
- With older studies (< 2005) more instrumental deliveries
- Often increases the duration of SSL
- Newborns require less naloxone than with systemic opioids

Meta-analysis of low concentration epidural vs. no epidural analgesia[2]

- No differences in the duration of first stage or SSL, instrumental birth or ceasarean delivery rate

1. Anim-Somuah H. Cochrane Database of Syst Rev 2018, Issue 5. Art. no.:CD000331.
2. Wang T. Anest Analg 2017;124:1571-80.

Epidural analgesia & Labour outcome



N = 94 217

1. Ledin-Eriksson. European J of O & G and Reprod Biology 2006 Sep-Oct;128(1-2):270-5

Fig. 1. Non-elective caesarean section rate and instrumental delivery related to hospital relative epidural frequency.

Traditional and low-dose local anesthetic epidural techniques & Outcome studies

Bupivacaine 0,25% + adr. vs Bupivacaine 1,25% with sufentanil 10 mcg[1]

- Bolus technique, also during SSL
- With latter: CS↓, instrumental deliveries ↓ and better analgesia during second stage

Bupivacaine 0,25 % epidural vs. CSE (25 mcg Fentanyl + bupivacaine 2,5 mg) + epidural with low dose (0,1% bupivacaine and 2 mcg /ml fentanyl) vs low dose epidural only[2]

- Also during SSL
- Less instrumental deliveries in low dose groups, no differences in CS rates

Meta-analysis[3]

- Bupivacaine (≤0.1% vs > 0.1%) or ropivacaine (≤0.17% vs > 0.17%)

- Less assisted vaginal delivery, duration of second stage shorter, analgesia equal

1. Olofsson C. AAS 1998:42:284-292
2. Comet study. Lancet 2001;358:19-23
3. Sultan, Can J Anaesth 2013:60(9):840-54

Low dose local anesthetic with opioid results in dimished CS and instrumental delivery rates

Maintenance of epidural analgesia

Continuous epidural infusion (CEI) vs Patient controlled epidural analgesia (PCEA)/Programmed intermittent bolus (PIEB) and Manual bolus techniques

- More motor block and greater local anesthetic use , more clinician top-ups needed[1]
- Peak pain↑, more unilateral blocks (5 vs 2%) [2]

Intermittent bolus[3] or PIEB vs CEI[4]

- 2nd stage duration ↓, better maternal satisfaction, lower local anesthetic consumption, no differences in CS-rate [3]
- Instrumental delivery rate OR 0.59 (p 0.05; CI 0.3-1) [3]
- No differences instrumental deliveries (12% vs 9%; RR 0.75 95% CI 0.5-1.1) [4]

1. Halpern, Douglas (Eds) Evidence-Based Obstetric Anesthesia BMJ 2006
2. McKenzie. In J Obstet Anesth 2015;25:32-8.
3. Georg R. Anesth Anal 2013;116:133-144.
4. Sng Cochrane Database of systematic reviews 2018, Issue 5, No.:CD011344

PCEA and PIEB result in better quality of analgesia but no differences in instrumental delivery/CS rates

Bolus vs. epidural infusion

- Larger spread of epidural bolus[1]
  - Epidural infusion 10,5 ml/h vs 3,5 ml (1 min bolus) q

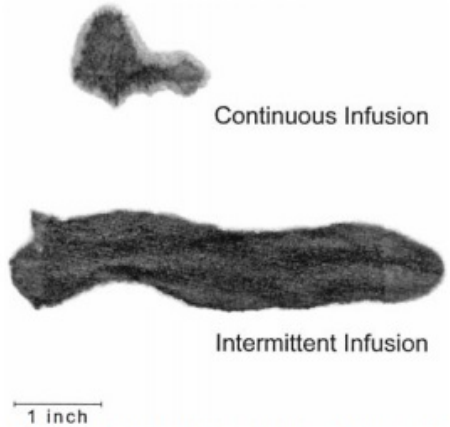


Figure 1. Area of diffusion of the contrast agent during continuous and intermittent infusions.

- Higher peak pressure generated by delivery pumps may augment the spread[2]
- More segmental effect of opioid with bolus dosing[3]
  - Epidural fentanyl bolus 30 µg vs infusion/h resulted in better segmental analgesia (leg > head)

1. Kaydar A. Anesth Analg 1999;89:534.
2. Klumpner TT. J Clin Anesth 2016; 34:6327
3. Ginosar. Anesth Analg 2003;97:1328-38

→ With bolus techniques better spread is achieved

Discontinuation of Epidural Analgesia & Second Stage of Labor

Bupivacaine 0.0625 mg/ml and fentanyl 2 µ/ml vs saline during SSL (n=75):[1]

- RCT, infusion
- Pain scores different at 60 min
- No differences in duration of SSL or instrumental deliveries

RCT of low concentration PCEA vs saline (n=560) [2]

- No effect on duration (52 vs 51 min) of SSL, mode of delivery or neonatal outcome
- Better satisfaction score in local anesthetic + fentanyl -group

Discontinuation of epidural analgesia late in labour no effect on outcomes, worse pain control[3]

Late epidural weakens the urge to push [4]

No effect on dynamics of fetal descent (Maroni et al. AOGS 2014) [5]

Omitting epidural analgesia during SSL does not affect the outcome of delivery but increases pain

1. Chestnut D. Anesthesiology 1990: 72:613-18.
2. Shen X. Obstet Gynecol 2017;130:1097-103.
3. Torvaldsen S. Cochrane Database of Syst Rev 2004, Issue 4. Art No.:CD004457.
4. Lemos A. Cochrane Database of Syst Rev 2015, Issue10. Art. No.: CD009124
5. Maroni E. AOGS. 2014;93:512-516.

Discontinuation of Local Anesthetics during Second Stage of Labour

Epidural analgesia in nulliparous women at 8-10 cm Cx opening) [1]

- Bupivacaine 0,125% + fentanyl 2 mcg/ml 10 ml/h vs fentanyl 10 mcg/ml 10 ml/h
- No differences: duration of second stage, degree of motor block, instrumental delivery rate
- Rescue analgesics needed more often ($p<0.005$) in fentanyl group
- 5 –fold dose of fentanyl required to achieve similar analgesia to bupi+ fenta group
- Neonatal Apgars similar at 1 and 5 min, not studied beyond that

RCT of epidural fentanyl only vs fentanyl and bupivacaine (Lindow et al IJOG 2004)

- No effect on instrumental deliveries, duration of second stage, higher pain scores with fentanyl only

Omitting local anesthetic during SSL does not result in better outcome of delivery but increases pain

1. Craig M. Anesthesiology 2015; 122:172-7.
2. Lindow S. BJOG: 2004. Oct, 111, 1075-1080

Spinal and Combined Spinal-Epidural analgesia & Second Stage of Labour

With both techniques:

- Fast and reliable block including sacral roots
- During SSL both opioid and local anesthetic needed
- L3/4 insertion is recommended

SSS (single shot technique):

- Duration of analgesia significantly shorter in late labour [1], → continuous techniques recommended
- Heavy vs plain bupivacaine: longer duration of analgesia with heavy bupivacaine [2]

Combined Spinal-epidural analgesia vs epidural

- Fewer epidural catheter failures vs epidural: 6.6 % vs. 11.6% [3]
- Fetal bradycardia (OR 1,3 – 1,8), pruritus and hypotension more common [4]
  - but no differences in mode of delivery, CS-rates, neonatal parameters

Especially suitable for multiparous parturient with fast deliveries

1. Viscomi Anesth Analg 997;84:1108-12
2. Teoh W. anesth analg 2003;97:873-7
3. Booth JM. Anesthesiology 2016;125:516-24.
4. Simmons SW. Cochrane Database Syst Rev 2012;(10):CD003401

CSE & Dural puncture epidural (DPE) technique during Second Stage of Labour

A new variant: Dural puncture epidural technique (DPE), = CSE without intrathecal dosing

DPE (25 G Whitacre) vs epidural, then PCEA [1]

- Improved sacral spread, less unilateral blocks

DPE vs CSE and epidural analgesia techniques[2]

- Vs epidural: faster and better quality block (sacral roots), less physician interventions
- VS CSE: pruritus↓, uterine hypertonus↓, hypotension ↓

G 25 needles required[3], PDPH incidence?

1. Cappiello. Anesth Analg 2008; 207,5:1646-51
2. Chau A. Anesth Analg 2017;124:560-9
3. Thomas JA. Anesthesiology 2005; 103: 1046-51.

Pudendal block & Second Stage of Labor

Anesthetises sacral nerves only

More effective than systemic opioids[1]

Randomised double-blind study with 1084 women[2]

- Loss of bearing down reflex in 31%
- Good effect in 70% of parturients during second stage
- 32% required additional analgesics

1. Novikova N. Cochrane Database of syst Rev 2012, 4, No.:CD009200.
2. Langhoff-Roos J. AOGS 64:269-273, 1985.

Key points

It is unethical not to treat pain during SSL

Individual pain relief is needed and sometimes balancing with urge to push and pain relief
- the role of midwives and obstetricians

Modern epidural analgesia does not increase CS or instrumental delivery rates

Causes less acidosis and better neurobehavioral scores in newborns compared with systemic opioid

Epidural analgesia for SSL
- Better preserves the ability to push than spinal techniques
- Use of low-dose combinations of local anesthetic and opioid
- Use bigger doses in larger volume, and bolus techniques

CSE (DPE)
- Good, fast and reliable analgesia is achieved for SSL
- Optimal choice for multiparous parturients in advanced labor

Pudendal block
- The success rate not as good as with central blocks
- May also cause motor block

Thank you!

Ref: Chestnuts' Obstetric Anesthesia. Principles and Practice. 5th Ed.

Pictures: Esko Viikilä and Elin Danielsson-Gambozi

Urge to push

Can be crucial for the delivery

- especially for primiparous women

Epidural analgesia

- seems to be better preserved

Spinal analgesia

- often vanished

Maintenance of epidural analgesia

PEOPLE (Pushing early or pushing late with epidural) trial[1]

- Effect of suboptimal second-stage pain control on the risk of difficult delivery
- Inability to sustain optimal epidural analgesia associated with increased risk of CS- rate and instrumental delivery in nulliparous women

Patient-controlled epidural analgesia (PCEA) vs intermittent bolus technique [2]

- PCEA: better pain control, higher consumption of bupivacaine, longer second stage, rate of spontaneous deliveries equal, higher CS rate
- No differences in motor block

1. Abenheim H. AJOG. 2008;199:500.e1-500.e6.
2. Halonen P. AAS 2004;46:732-737.

Potential hazards with medical analgesia during SSL

Interference of normal delivery

- Increase of instrumental delivery (vacuum of forceps) and C-section rates
- Increased duration of labour
- With fetal presentation
- Increased risk of complications: lacerations, bleeding…
- Effect on the newborn

Dimished contractions, increased motor block

- Decreased ability and urge to push

Agenda

Neuroanatomy of pain transmission

Pain level during second stage of labour (SSL)

Factors affecting outcome during second stage of delivery

Neuraxial approaches against pain during SSL:

- Epidural analgesia
- Spinal analgesia & Combined spinal-epidural (CSE) and Dural Punture Epidural (DPE) analgesia
- Pudendal block

Conclusion

Traditional and low-dose local anesthetic epidural techniques & Outcome studies

Bupivacaine 0,25% + adr. vs Bupivacaine 1,25% with sufentanil 10 mcg[1]

- Bolus technique, also during SSL
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Bupivacaine 0,25 % epidural low dose (0,1% bupivacaine

- Also during SSL
- Less instrumental deliveries

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Delivery	Traditional epidural (n=353)	Combined spinal epidural (n=351)	Low-dose infusion epidural (n=350)
Normal vaginal	124 (35%)	150 (43%)	150 (43%)
Instrumental vaginal	131 (37%)	102 (29%)	98 (28%)
Caesarean section	98 (28%)	99 (28%)	102 (29%)

*p=0·04, 1DF for normal vs other deliveries.

Table 3: **Mode of delivery**

Meta-analysis[3]

- Bupivacaine (0.1% vs > 0.1%) or ropivacaine (0.17% vs > 0.17%)

- Less assisted vaginal delivery, duration of second stage shorter, analgesia equal

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