
Current Management of Labour Analgesia – Epidural or CSE, Bolus or Infusions?



Dr Mark Esler
Queen Charlotte's and Chelsea Hospital
Imperial College Healthcare NHS Trust
1st October 2014

Joseph Joubert 1754-1824

- “It is better to debate a question without settling it than to settle a question without debating it”
- “Those who never retract their opinions love themselves more than they love truth”



It's good news...

- ALL techniques for initiation and maintenance of neuraxial analgesia in labour work...
...really well!
...really often!
 - So not surprising that showing differences between techniques is challenging and hence there is wide variation in practice
 - In such areas 'best evidence' may fail to give you the answers to help define all your practice
-

History of CSE for labour analgesia

- From a time of ‘traditional’ epidurals
 - Concern about obstetric intervention – slowing labour, oxytocin augmentation, instrumental delivery, Caesarean section rate
 - Mobilisation in labour was perceived as desirable and worthwhile
 - ‘Low dose’ epidural solutions worked fine *without the spinal component* and were *mobile* – this helped define new epidural standard
-

So what are we actually comparing?

- CSE - bupivacaine (up to 2.5mg) with fentanyl (up to 25mcg) then bupivacaine 0.1% with fentanyl 2mcg/ml (LDM) epidurally by infusion/bolus
 - Epidural - up to 20 mls LDM then as above
 - Much confusion exists over claimed *benefits* of CSE and over *risks* - both have been *exaggerated*
-

CSE has some clear advantages

- Faster onset - is 5-10 minutes clinically important?
 - Fewer early failures - where epidural has higher failure rate such as scoliosis, obesity, poor LOR or for the inexperienced epiduralist
 - Reliable sacral analgesia - when sacral blockade is required or for rapidly progressing labour
-

CSE might have other benefits but many are inconsistently demonstrated in studies

- Lower pain scores?
 - Fewer rescue top-ups?
 - Fewer one-sided blocks?
 - Reduced need for late resiting of epidural?
 - Fewer failures when topping up for Caesarean?
 - Less motor block??
 - Higher maternal satisfaction??
 - Anaesthetist satisfaction?
-

CSE has some clear disadvantages

- Pruritis more frequent and severe
- Early fetal bradycardia more frequently seen

Both are associated with spinal opioid, and possibly dose-related.

- Dural Puncture Epidural - CSE with no spinal injection
-

CSE might have other theoretical or potential problems but evidence lacking

- Higher risk of meningitis?
 - Higher risk of post dural puncture headache??
 - More maternal hypotension??
 - Conus damage??
 - Drug error or contamination??
 - 'Untested' epidural catheter??
 - Higher risk of neurological injury??
-

NAP3: 3rd National Audit of the RCOA

NAP 3

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

MAJOR COMPLICATIONS OF CENTRAL NEURAXIAL BLOCK IN THE UK

MAJOR COMPLICATIONS OF CENTRAL NEURAXIAL BLOCK IN THE UNITED KINGDOM

Report and findings Jan 2009

REPORT AND FINDINGS
JANUARY 2009



NAP 3 – what should I conclude?

- *‘Considering the relatively small number of combined spinal epidurals performed the number of associated reports of harm is concerning’*
- *‘Two of the deaths followed its use’*
- 4 of the 30 ‘pessimistic’ permanent harm cases followed CSE, but only 4 of the 30 were obstetric (2 after CSE classified as 1 nerve injury and 1 miscellaneous)
- Epidural 0-3.4 vs CSE 1-22 (or 0-11.8 optimistic) harm events per 100,000 in obstetrics based on 161,000 and 25,000 cases
- 1 death due to iv bupivacaine administered on ICU
- The other death followed a bupivacaine ‘epidural’ infusion running on an unmonitored patient after inadvertent dural tap



THE NEWSLETTER
OF THE
ASSOCIATION
OF ANAESTHETISTS
OF GREAT BRITAIN
AND IRELAND

ANAESTHESIA NEWS

ISSN 0959-2962 No. 325

AUG 2014

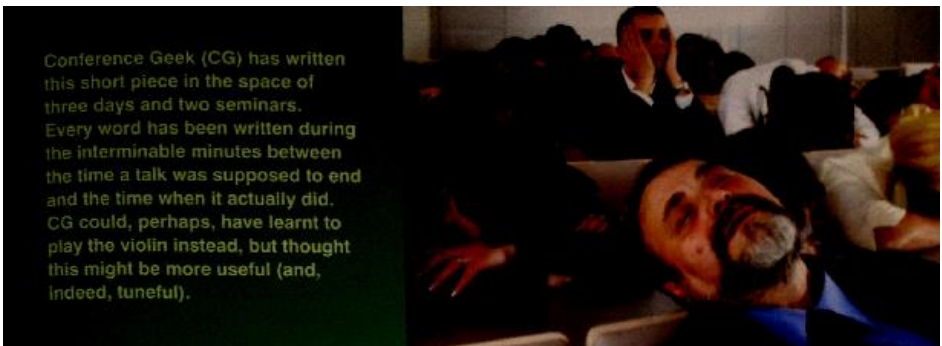


INSIDE THIS ISSUE:

The AAGBI Harrogate
Cycle Ride for Guy

The Deprivation
of Liberty Safeguards

Designing an International
Anaesthesia Machine



Conference Geek (CG) has written this short piece in the space of three days and two seminars. Every word has been written during the interminable minutes between the time a talk was supposed to end and the time when it actually did. CG could, perhaps, have learnt to play the violin instead, but thought this might be more useful (and, indeed, tuneful).

Random thoughts of a conference geek - **over-runs**

CG REALLY DOESN'T LIKE SPEAKERS WHO OVER-RUN. Let CG be clear about this. This is not about lectures that over-run - none of that soft hats the crime, love the criminal stuff - it's about the people who deliver them.

Speakers who over-run are giving you, the paying audience, a number of messages:

1. I am an important person - you are lucky to be able to listen to me for 30 minutes, and even luckier to do so for 50 minutes.
2. I have nothing but contempt for the poor organisers. They were very fortunate that I happened to be free when they asked me and that I was willing to travel to this godforsaken venue at their expense to enhance their paltry programme with my stellar contribution.
3. I am a very busy person. I've given this talk lots of times before, usually for much bigger meetings and sometimes even in foreign lands, and I certainly don't have time to cut it down just to fit in with what the organisers wanted.
4. My stuff is important. I've been dealing with this stuff for the last 20 years, and I don't see why the organisers think I could possibly summarise it in a 30-minute talk.
5. Everyone else's stuff is unimportant. It's not my stuff, so it doesn't matter.
6. The other speakers aren't important. They're not me, so they can't be important, particularly if they're just a bunch of trainees waiting to give a seven-minute free paper so they can further their unimportant careers which will never match the glory of mine.
7. I have no interest at all in the blood pressure of the chairman, who is just a local consultant for whom introducing me is the highlight of his mediocre career, and who, being a decent chap, is too polite to interrupt me.
8. In particular, I have no respect for my audience. If they have, for unfathomable reasons, turned up because they are interested in some other topic listed to be delivered during this session, that is their problem, not mine.

Mal Morgan, a past President of the AAGBI, told of a conference he'd attended where a very dull speaker, reading verbatim from a sheaf of notes, ran on and on, through the time allotted for questions and well into the lunch break. As the audience grew more restless, the Chair tried the usual tricks. He coughed, he looked at his watch, he stood up, he walked back and forth in a meaningful manner, and the speaker droned on. Finally, the Chair walked over to the podium, took out his cigarette lighter and set fire to the speaker's notes. Everyone cheered and went off for a late lunch.

This rather dramatic approach may not always be appropriate, but there are ways for conference organisers and Chairs to handle these people. Organisers should contact speakers on several occasions over the preceding months, each time reminding them of how many minutes have been allocated for their talk, whether this includes time for audience questions and who is doing what in the other slots of their session. Feedback forms should include a specific score for time-keeping. Thank you letters, often filed by speakers in their appraisal folders, should include a sentence along the lines of: 'we were disappointed that, despite our best attempts to keep you to the allotted time, you chose to over-run by xx minutes. Feedback has indicated that this adversely affected the experience of some delegates and disoriented other speakers'.

As for Chairs, CG suggests you gather your speakers before the session and - taking your cue from 'safer surgery' - have a huddle, in which you stress how long each speaker has been given. Ask them if they think they will over-run. If they say they will, fix them with a basilisk-like stare and tell them not to. When, despite this, they still waffle on, just stand up, thank them politely, and introduce the next speaker.

And never, ever, invite them again.

Conference Geek

Maintenance – bolus or infusions?

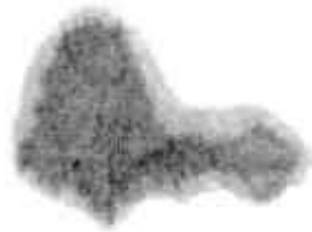
- Dilute local anaesthetic solutions with opioid reduce negative impacts on labour/obstetric outcome
 - Intermittent top-ups (boluses) were used first
 - Infusions then followed in USA - no midwife top-ups!
 - Technology then allowed parturient controlled epidural drug administration, with increasing sophistication now including automated boluses and computer control

 - No single method or regimen been shown to be clearly 'superior' to another so wide variation in practice
-

Physical characteristics of infusion dosing

- Infusions deliver more drug through the proximal hole of multiport catheters
 - Uniport catheters are associated with a greater incidence of inadequate analgesia and unilateral blockade
-

Simulated epidural spread: continuous infusion vs 'intermittent infusion' i.e. bolus



Continuous Infusion



Intermittent Infusion

1 inch

Intermittent Top-ups (vs Infusions)

Pros:

- Midwife involved
- Dose-sparing
- Less motor block

Cons:

- Time-consuming for midwife or anesthesiologist
 - Drug error potential
 - Concerns about controlled drug access
-

Physical characteristics of bolus dosing

- Infusions deliver more drug through the proximal hole of multiport catheters
 - Uniport catheters are associated with a greater incidence of inadequate analgesia and unilateral blockade
 - But intermittent top-ups are a declining method of maintenance for various reasons including midwifery workload, controlled drug issues and suggested benefits of newer methods like PCEA
-

What are UK departments using?

- Postal survey in 1999:
 - 41% top-ups, 48% infusions, 3% PCEA
 - London telephone survey in 2004:
 - 60% top-ups, 29% infusions, 11% PCEA
 - OAA survey in 2007:
 - 20% PCEA
 - OAA survey in 2012:
 - 50% PCEA
-

Maintenance – bolus or infusions?

- Many regimens:
 - Parturient Bolus: 3 to 10 mls
 - Lockout: 5 to 20 mins
 - Background Infusion: 0 to 10 mls/hr
 - Hourly Maximum: 20 to 30 mls
 - Background infusion *may* reduce rescue, and some studies support larger bolus volumes
-

Maintenance - programmed intermittent epidural bolus or background infusions?

- Many regimens:
 - Parturient Bolus: 3 to 10 mls
 - Lockout: 5 to 20 mins
 - Background Infusion: 0 to 10 mls/hr
 - **Programmed Intermittent Bolus: 0 to 10 mls**
 - Hourly Maximum: 20 to 30 mls
 - Background infusion *may* reduce rescue, and some studies support larger bolus volumes
-



Smiths CADD-Solis Pump



‘PCEA plus’

- Programmed intermittent epidural boluses (aka: automated mandatory boluses)
 - Small reduction in bupivacaine dosing compared to background infusion
 - Higher maternal satisfaction
 - Fewer rescue top-ups?
 - Reduction in motor block?
 - No consistent effect on obstetric outcome
-

What is your ultimate goal?

- 'Standard' care few can criticise?
 - Individualised care which demands
 - greater knowledge, experience and understanding
 - a flexible approach
 - a willingness to take a fresh look at risk and benefit for each patient or unit
-

What are my conclusions?

- Initiate with CSE in selected parturients
 - Maintain by midwife bolus or PCEA with generous volume bolus by parturient and pump
-

Thank you for your attention.

- Initiate with CSE in selected parturients
 - Maintain by midwife bolus or PCEA with generous volume bolus by parturient and pump
 - Further reading:
 - references (including the most recent and relevant meta-analyses and reviews*) follow
-

References 1

- *Bauer ME et al. Risk factors for failed conversion of labor epidural analgesia to cesarean delivery anesthesia: a systematic review and meta-analysis of observational trials. *Int J Obstet Anesth* 2012;21:294-309
- Boswell O et al. The use of obstetric patient-controlled epidural analgesia: a survey of labour wards across the UK. *Int J Obstet Anesth* 2007;16:S39
- Burnstein R et al. A survey of epidural analgesia for labour in the United Kingdom. *Anaesthesia* 1999;54:634-40
- Capogna G et al. Programmed intermittent epidural bolus versus continuous epidural infusion for labor analgesia: the effects on maternal motor function and labor outcome. A randomized double-blind study in nulliparous women. *Anesth Analg* 2011;113:826-31
- *Capogna G et al. Techniques for the maintenance of epidural labor analgesia. *Curr Opin Anaesthesiol* 2013;26:261-7
- *Cappiello E et al. A randomized trial of dural puncture epidural technique compared with the standard epidural technique for labor analgesia. *Anesth Analg* 2008;107:1646-51
- Cascio M et al. Meningitis following combined spinal-epidural technique in a labouring term parturient. *Can J Anesth* 1996;43:399-401
- Christiaens F et al. Effects of diluent volume of a single dose of epidural bupivacaine in parturients during the first stage of labour. *Reg Anesth Pain Med* 1998;23:134-41
- Collis RE et al. Combined spinal epidural (CSE) analgesia: technique, management, and outcome of 300 mothers. *Int J Obstet Anesth* 1994;3:75-81
- *COMET Study Group UK. Effect of low-dose mobile versus traditional epidural techniques on mode of delivery: a randomised controlled trial. *Lancet* 2001;358:19-23

References 2

- Cooper GM et al. Satisfaction, control and pain relief: short- and long-term assessments in a randomised controlled trial of low-dose and traditional epidurals and a non-epidural comparison group. *Int J Obstet Anesth* 2010;19:31-7
- D'Angelo R et al. A comparison of multiport and uniport epidural catheters in laboring patients. *Anesth Analg* 1997;84:1276-9
- Gambling DR vs Bogod D. Epidural infusions in labour should be abandoned in favour of patient-controlled epidural analgesia. *Int J Obstet Anesth* 1996;5:59-63
- Gambling D et al. A randomized controlled comparison of epidural analgesia and combined spinal-epidural analgesia in a private practice setting: pain scores during first and second stages of labor and at delivery. *Anesth Analg* 2013;116:636-43
- *George RB et al. Intermittent epidural bolus compared with continuous epidural infusions for labor analgesia: a systematic review and meta-analysis. *Anesth Analg* 2013;116:133-44
- Goodman SR et al. A randomized trial of breakthrough pain during combined spinal-epidural versus epidural labor analgesia in parous women. *Anesth Analg* 2009;108:246-51
- Griffiths S et al. Headache after combined spinal-epidural blocks: a ten year review. *Int J Obstet Anesth* 2013;22:S55
- Gupta D et al. Dural puncture epidural analgesia is not superior to continuous labor epidural analgesia. *Middle East J Anesthesiol* 2013;22:309-16
- *Halpern SH et al. Patient-controlled epidural analgesia for labor. *Anesth Analg* 2009;108:921-8
- *Heesen M et al. Meta-analysis of the success of block following combined spinal-epidural vs epidural analgesia during labour. *Anaesthesia* 2014;69:64-71

References 3

- Hepner DL et al. Comparison of combined spinal-epidural and low dose epidural for labour analgesia. *Can J Anaesth* 2000;47:232-6
- Hess PE et al. Predictors of breakthrough pain during labor analgesia. *Anesth Analg* 2001;93:414-8
- *Kaynar AM et al. Epidural infusion: continuous or bolus? *Anesth Analg* 1999;89:534
- Lee S et al. Failure of augmentation of labor epidural analgesia for intrapartum cesarean delivery. *Anesth Analg* 2009;108:252-4
- Leo S et al. A randomized comparison of automated intermittent mandatory boluses with a basal infusion in combination with patient-controlled epidural analgesia for labor and delivery. *Int J Obstet Anesth* 2010;19:357-64
- Leo S et al. Maintaining labour epidural analgesia: what is the best option? *Curr Opin Anaesthesiol* 2008;21:263-9
- Lim Y et al. Automated regular boluses for epidural analgesia: a comparison with continuous infusion. *Int J Obstet Anesth* 2005;4:305-309
- *Loubert C et al. Update on modern neuraxial analgesia in labour: a review of the literature of the last 5 years. *Anaesthesia* 2011;66:191-212
- Lyons GR et al. Extradural pain relief in labour: bupivacaine sparing by extradural fentanyl is dose dependent. *Br J Anaesth* 1997;78:493-7
- Lyons GR et al. A comparison of minimum local anesthetic volumes and doses of epidural bupivacaine (0.125% w/v and 0.25% w/v) for analgesia in labor. *Anesth Analg* 2007;104:412-5

References 4

- *Mardirosoff C et al. Fetal bradycardia due to intrathecal opioids for labour analgesia: a systematic review. *Br J Obstet Gynaecol* 2002;109:274-81
- *Niesen AD et al. Combined spinal-epidural versus epidural analgesia for labor and delivery. *Clin Perinatol* 2013;40:373-84
- Norris MC. Are combined spinal-epidural catheters reliable? *Int J Obstet Anesth* 2000;9:3-6
- Paech MJ. Patient-controlled epidural analgesia in obstetrics. *Int J Obstet Anesth* 1996;5:115-25
- Paech MJ et al. New recipes for neuraxial labor analgesia: simple fare or gourmet combos? *Int J Obstet Anesth* 2009;18:201-3
- Palmer et al. The dose-response relation of intrathecal fentanyl for labor analgesia. *Anesthesiology* 1998;88:355-61
- Pan PH et al. Incidence and characteristics of failures in obstetric neuraxial analgesia and anesthesia: a retrospective analysis of 19,259 deliveries. *Int J Obstet Anesth* 2004;13:227-33
- Parpaglioni R et al. Minimum local analgesic dose: effect of different volumes of intrathecal levobupivacaine in early labor. *Anesthesiology* 2005;103:1233-716
- Preston R. The role of combined spinal epidural analgesia for labour: is there still a question? *Can J Anesth* 2007;54:9-14
- Reynolds F. Damage to the conus medullaris following spinal anaesthesia. *Anaesthesia* 2001;56:238-47
- Shukla B et al. Practice of patient controlled epidural analgesia (PCEA) in obstetric units: a national survey of current practice. OAA Poster 2013

References 5

- Sia AT et al. A comparison of a basal infusion with automated mandatory boluses in parturient-controlled epidural analgesia during labor. *Anesth Analg* 2007;104:673-8
- *Simmons SW et al. Combined spinal-epidural versus epidural analgesia in labour. *Cochrane Database of Systematic Reviews* 2012
- Skupski DW et al. Adverse effects of combined spinal-epidural versus traditional epidural analgesia during labor. *Int J Gynaecol Obstet* 2009;106:242-5
- Smiley RM et al. Patient-controlled epidural analgesia for labor. *International Anesthesiology Clinics* 2007;45:83-98
- Stocks G et al. Minimum local analgesic dose of intrathecal bupivacaine in labor and the effect of intrathecal fentanyl. *Anesthesiology* 2001;94:593-8
- Thomas JA et al. Dural puncture with a 27-gauge Whitacre needle as part of a combined spinal-epidural technique does not improve labor epidural catheter function. *Anesthesiology* 2005;103:1046-51
- Van de Velde M vs Benhamou D. Intermittent top-ups are better than continuous infusions for epidural analgesia in labour. *Int J Obstet Anesth* 2000;9:259-63
- *Van der Vyver M et al. Patient-controlled epidural analgesia versus continuous infusion for labour analgesia: a meta-analysis. *Br J Anaesth* 2002;89:459-65
- Wong CA et al. A randomized comparison of programmed intermittent epidural bolus with continuous epidural infusion for labor analgesia. *Anesth Analg* 2006;102:904-9
- *Wong CA et al. The effect of manipulation of the programmed intermittent bolus time interval and injection volume on total drug use for labor epidural analgesia: a randomized controlled trial. *Anesth Analg* 2011;112:904-11