Rates of Caesarean section and instrumental vaginal delivery in nulliparous women after low concentration epidural infusions or opioid analgesia: systematic review

Liu E H, Sia A T

CRD summary
This review compared the use of parenteral opioid analgesia during labour with epidural analgesia using low concentrations of bupivacaine in nulliparous women. The authors concluded that epidural analgesia is unlikely to increase the risk of Caesarean section, but it may increase instrumental vaginal delivery. Since it was not always clear if the results differed among studies, the authors' conclusions should be accepted with some caution.

Authors' objectives
To compare the effects of low concentration epidural infusions of bupivacaine with parenteral opioid analgesia on the rates of Caesarean section and instrumental vaginal delivery in nulliparous women.

Searching
MEDLINE, EMBASE and the Cochrane Controlled Trials Register were searched up to June 2003; the search terms were reported. In addition, the International Journal of Obstetric Anaesthesia was handsearched. The bibliographies of relevant studies and reports were checked.

Study selection
Study designs of evaluations included in the review
Only randomised controlled trials (RCTs) were eligible for the review.

Specific interventions included in the review
Trials comparing epidural infusions of low concentrations of local anaesthetics with parenteral opioids were eligible for inclusion. The epidural infusion had to continue during the second stage of labour. Trials using high concentration boluses of local anaesthetic were excluded. All of the included trials used bupivacaine (doses ranging from 0.125 to 0.0625%). In most trials fentanyl was also administered by epidural, and in some trials lignocaine was also part of the anaesthetic mix. In all but one trial the parenteral opioid was pethidine.

Participants included in the review
The inclusion criteria were not defined in terms of participants, but only data for nulliparous women were included in the analyses. All the data from the included studies pertained to women with full-term uncomplicated pregnancies with cephalic presentation. All but one of the studies were conducted in women undergoing spontaneous labour.

Outcomes assessed in the review
Studies that assessed the risk of instrumental deliveries (i.e. Caesarean and assisted vaginal deliveries) were eligible for inclusion. All of the trials included in the review provided data on Caesarean section and instrumental deliveries. Other outcomes considered in the review were the mean duration of second stage, crossover to other treatment, requirement for oxytocin and neonatal outcomes.

How were decisions on the relevance of primary studies made?
Trials were only included in the review after the quality assessment had been completed and the trial confirmed as meeting review inclusion criteria. The authors did not state how many reviewers selected papers from the results of the search.

Assessment of study quality
Trial validity was assessed using the Scottish Intercollegiate Guideline Network Checklist (citation given in report).
This assessed randomisation, allocation concealment, blinding, similarity of the groups at baseline, equal treatment of the groups, losses to follow-up and the use of intention-to-treat analysis. Two reviewers independently assessed and scored each included study.

**Data extraction**
Two reviewers independently extracted the data in duplicate and crosschecked the data.

**Methods of synthesis**

*How were the studies combined?*
The outcome data from the primary studies were combined in meta-analyses using a random-effects model. Pooled odds ratios (ORs) or weighted mean differences (WMDs) were calculated, along with 95% confidence intervals (CIs).

*How were differences between studies investigated?*
Statistical heterogeneity was tested formally; the authors did not specify which test they used, nor did they report numerical results. Where heterogeneity was detected, sensitivity analyses were performed.

**Results of the review**
Seven trials (n=2,962) were included.

All studies had adequate allocation concealment. The treatment groups were similar at baseline and intention-to-treat analyses were performed. None of the studies used blinding.

Epidural analgesia was not associated with any statistically significant increased risk of Caesarean section (OR 1.03, 95% CI: 0.71, 1.48). Significant statistical heterogeneity was found. When one small trial with a greatly increased section rate was eliminated from the analysis, the heterogeneity was resolved and the OR changed only slightly. The overall result, however, remained not statistically significant (OR 1.01, 95% CI: 0.80, 1.28).

There was an increased risk of instrumental vaginal delivery with epidural analgesia, although this did not reach statistical significance (OR 2.11, 95% CI: 0.95, 4.65). After excluding data from women with induced labour and those who had elective forceps delivery, the risk was higher but not significantly higher (OR 2.11, 95% CI: 0.96, 4.65).

Epidural analgesia was associated with a statistically significant increased risk of operative delivery (OR 1.63, 95% CI: 1.09, 2.42). A lower risk was obtained when two trials that used elective forceps deliveries and forceps deliveries for training purposes were excluded from the analysis.

Epidural analgesia was associated with a statistically significantly longer second stage of labour (WMD 15.2 minutes, 95% CI: 2.1, 28.2).

Significantly fewer women randomised to epidural changed to parenteral opioids than did women from opioids to epidural (OR 0.1, 95% CI: 0.5 to 0.22).

No statistically significant differences in neonatal outcomes were found between treatments. Epidural analgesia was associated with fewer neonates with Apgar scores of less than 7 (4 RCTs; OR 0.72, 95% CI: 0.26, 2.04) and an umbilical pH of less than 7.2 (3 RCTs; OR 0.72, 95% CI: 0.40, 1.27) in comparison with parenteral opioids, but these differences were not statistically significant.

**Authors' conclusions**
Epidural analgesia using low concentrations of bupivacaine is unlikely to increase the risk of Caesarean section in comparison with parenteral opioid analgesia, but it may increase the risk of instrumental vaginal delivery. Although women given epidural analgesia had a longer duration of second stage of labour, they had better pain relief.
CRD commentary
This review addressed a very specific and clearly defined research question. The literature search was thorough although, since experts in the field were not contacted, it is possible that some studies were missed. The appropriateness of the review methods means that reviewer bias is likely to have been minimised. The methods of analysis were also appropriate. However, details of the results of the primary studies were presented only for the primary outcome, and the results of the test for heterogeneity and meta-analysis graphs were not reported for every pooled result. Therefore, the reader has to rely on the pooled estimates and the authors’ interpretation. The authors’ conclusions should therefore be accepted with caution since it was not always clear if the results among studies differed.

Implications of the review for practice and research
Practice: The authors suggested that fears about an increased risk of Caesarean section should not be used to discourage epidural analgesia in nulliparous women if requested.

Research: The authors did not state any implications for further research.

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