Epidural analgesia in association with duration of labor and mode of delivery: a quantitative review
Zhang J, Klebanoff M A, DerSimonian R

Authors' objectives
To determine the effects of epidural anaesthesia in labour on the duration of labour and mode of delivery.

Searching
Articles published in the English language were sought in MEDLINE (1965 to December 1997) using the following keywords: 'epidural', 'labor', 'forceps', 'caesarean' and 'delivery'. References in identified studies were cross-checked.

Study selection
Study designs of evaluations included in the review
Studies that focused on the effects of epidural anaesthesia in labour were included in the review if they scored >= 3 (out of a maximum of 5) on quality criteria. Both RCTs and observational studies (including matched prospective, retrospective studies, chart reviews and one before/after study) were included. Three studies that addressed a different question from the other RCTs (epidural anaesthesia in the second stage of labour) were excluded from the meta-analysis.

Specific interventions included in the review
Epidural regimens in the randomised controlled trials (RCTs) included continuous 0.75% lidocaine in second stage or continuous 0.125% bupivacaine (either throughout or starting at 3 to 5 cm cervical dilatation or in second stage) with or without fentanyl (1.5 to 2 micrograms/mL). Control regimes included placebo in the second stage, 10 mg intravenous nalbuphine until >= 5cm then 0.125% bupivacaine, 75 mg intramuscular pethidine, narcotics, patient controlled intravenous meperidine and 1 to 2 mg intravenous butorphanol every 1 to 2 hours.

Participants included in the review
Participants included nulliparous singleton pregnancies with vertex presentation in labour (including spontaneous labour) at term. Some participants were included after they had reached between 3 and 5 cm of cervical dilatation.

Outcomes assessed in the review
The following outcomes were assessed: durations of the first and second stage of labour; rates of Caesarean section delivery, instrumental delivery (use of forceps or vacuum extraction); and oxytocin augmentation. The definition of the first stage of labour varied between studies.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
Studies were allocated scores from 0 to a maximum of 5 according to the following design and execution criteria: score 5 for well-designed carefully conducted RCTs with little cross-over between epidural and control groups; score 4 for RCTs that were not optimised but in which randomisation was fully executed or excellent observational studies in which no obvious bias could be identified or potential biases were controlled for; score 3 for observational studies in which control subjects were carefully sought out and adjustment made for major potential biases but residual confounding appeared likely; score 2 for observational studies in which selection of controls was less strict with poor adjustment for potential bias; score 1 for observational studies with loose criteria for selection of controls and no adjustment for bias; and score 0 for observational studies without appropriate control subjects. Two authors independently assigned a validity score with disagreement being resolved by discussion of by an independent assessor.
Data extraction
The following data were extracted: study design; criteria for eligibility; intervention; local anaesthetics used for epidural and non epidural analgesia; results and potential problems. The ratio for the durations of stages of labour between groups was calculated. The authors do not state how data were extracted for the review, or how many of the reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The ratios for duration of labour were pooled and results expressed as the percentage of increase (or decrease) in duration. Data presented were results with data from compliant women only. A random-effects model was used to estimate the pooled relative risk and 99% confidence intervals (CIs) for Caesarean section, instrumental deliveries and oxytocin augmentation.

How were differences between studies investigated?
RCTs and observational studies were analysed separately. Statistical heterogeneity under each outcome measure was assessed using the Q statistic. Where statistical heterogeneity was found, the pooled results were calculated both including and excluding studies that gave results that were significantly different from the rest.

Results of the review
A total of 7 RCTs (1285 women) and 5 observational studies (2961 women) were included in the review with meta-analysis limited to 4 RCTs (806 women) and 4 observational studies (2167 women).

Intra class correlation coefficient for validity scores was 0.82. Conventional t tests were used in all but one study to examine difference in duration of labour between groups despite the markedly skewed distribution.

Rates of Caesarean section delivery: results from one study were significantly different from the others (P = 0.03). Results suggest that epidural anaesthesia does not increase the Caesarean section rate. Overall RR (4 RCTs) = 1.66 (99% CI: 0.59, 4.68). After omission of study with differing results RR = 1.20 (99% CI: 0.57, 2.50). Caesarean section rates for dystocia (4 RCTs): no increase after epidural with RR = 1.75 (99% CI: 0.58, 5.30).

Instrumental delivery (4 RCTs): no increase after epidural with RR = 1.57 (99% CI: 0.92, 2.68).

Oxytocin augmentation (3 RCTs): Studies were heterogeneous. No increase after epidural with RR = 1.56 (99% CI: 0.64, 3.80). After exclusion of one RCT with significantly greater use of oxytocin (70% to 80%) epidural anaesthesia was associated with a significant increase in oxytocin augmentation with RR = 2.16 (99% CI: 1.40, 3.40).

Duration of the first stage of labour: conflicting results were reported with two RCTs reporting no increase in duration with pooled RR = 1.07 (99% CI: 0.92, 1.25) and two RCTs reporting an increase in duration with pooled RR = 1.31 (99% CI: 1.17, 1.45).

Duration of the second stage of labour: Studies were heterogeneous. Overall there was a significant increase after epidural with RR = 1.37 (99% CI: 1.07, 1.76). After exclusion of one study reporting a significantly greater difference than the others the second stage was increased after epidural with RR = 1.27 (99% CI: 1.15, 1.40).

Observational studies: all results were homogeneous under each outcome measured. Except for oxytocin augmentation the effects were substantially greater than those from the RCTs. Caesarean section RR = 4.16 (99% CI: 2.56, 6.76). Instrumental delivery RR = 4.72 (99% CI: 3.08, 7.24). Duration of first stage RR (2 studies) RR = 1.46 (99% CI: 1.21, 1.77). Duration of second stage RR (3 studies) RR = 1.63 (99% CI: 1.20, 2.20). Oxytocin augmentation was significantly increased after epidural (3 studies) with RR = 2.00 (99% CI: 1.32, 3.02).

Authors' conclusions
Epidural analgesia with low-dose bupivicaine may increase the risk of oxytocin augmentation but not that of Caesarean delivery.
CRD commentary
This review was clearly written and presented. The aims and inclusion criteria were stated. Relevant details of the included studies were clearly presented in tabular format. Outcomes were specified and attention drawn to the variability in definitions used for duration of stages of labour. Validity was assessed according to defined criteria and methods used to assess validity were described. Statistical heterogeneity was assessed and some investigation of heterogeneity undertaken. Potential sources of bias were discussed and limitations of the review acknowledged such as the restricted nature of the literature search, differences among studies in entry criteria, large baseline variation in instrumental delivery rates, and the problems of competition and confounding among individual outcome measures.

The authors correctly advise caution in the interpretation of these results in view of the clinical and statistical heterogeneity among studies.

Implications of the review for practice and research
The authors do not report any clinical or research implications of the review.

Bibliographic details

PubMedID
10203666

Indexing Status
Subject indexing assigned by NLM

MeSH
Analgesia, Epidural; Analgesia, Obstetrical; Delivery, Obstetric; Female; Humans; Labor, Obstetric; Pregnancy; Randomized Controlled Trials as Topic; Time Factors

AccessionNumber
11999000951

Date bibliographic record published
28/02/2001

Date abstract record published
28/02/2001

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.