Intrapartum amnioinfusion for meconium-stained fluid: meta-analysis of prospective clinical trials

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Authors' objectives
To evaluate the effectiveness of intrapartum prophylactic amnioinfusion in pregnancies complicated by meconium-stained amniotic fluid (AF).

Searching
MEDLINE and PubMed were searched from January 1980 to December 1998 using the search terms 'amnioinfusion' and 'meconium'. The authors also checked the references of published articles and chapters from textbooks. Any restrictions on the publication language were not stated. Abstracts were included in the analysis, whereas unpublished trials and data were not.

Study selection
Study designs of evaluations included in the review
Prospective clinical trials were included.

Specific interventions included in the review
Intrapartum prophylactic amnioinfusion with saline solution, ranging from 500 to 1,000 mL, infused in 20 to 60 minutes. Administration was followed by various maintenance infusion schemes until delivery, or when a certain AF index was obtained.

Participants included in the review
Pregnant women in labour whose pregnancies are complicated by moderate to thick meconium-stained AF. Participants with other indications for amnioinfusion were excluded from the review. The number of women randomly assigned to amnioinfusion groups ranged from 17 to 323, with control groups generally of a similar size (18 to 329).

Outcomes assessed in the review
Meconium below the vocal chords, meconium aspiration syndrome, foetal acidaemia (umbilical artery pH below 7.20), Caesarean delivery, and postpartum endometritis.

How were decisions on the relevance of primary studies made?
All of the trials were reviewed independently by the investigators. It was not reported how many investigators reviewed each individual trial.

Assessment of study quality
The included trials were evaluated using the method of Chalmers et al. (see Other Publications of Related Interest no.1) for the items of quality of methodology, inclusion and exclusion criteria, adequacy of the randomisation schemes, description of amnioinfusion protocols, definition of outcomes reported, and statistical analyses. The authors do not state how many of the reviewers performed the quality assessment.

Data extraction
Data for the main outcome measures were extracted independently from each of the selected studies by two of the authors, using a predetermined form. The authors do not state what other data were extracted and an extraction table is not reported in the review.
Methods of synthesis

How were the studies combined?

Pooled odds ratios (ORs) and risk differences, with 95% confidence intervals (CIs), were calculated using the random-effects model of DerSimonian and Laird (see Other Publications of Related Interest no.2) and the fixed-effect model of Mantel-Haenszel (see Other Publications of Related Interest no.3); only the fixed-effect results are reported in the review.

Publication bias was examined by visual inspection of a funnel plot.

How were differences between studies investigated?

Homogeneity was tested using the chi-squared statistic.

Results of the review

Thirteen studies (2 of which were reported in abstract form) with 1,924 participants (950 who received amnioinfusion during labour and 974 controls) were included in the review.

Intrapartum amnioinfusion significantly reduced the frequency of meconium aspiration syndrome (OR 0.30, 95% CI: 0.19, 0.46).

Intrapartum amnioinfusion significantly reduced the presence of meconium below the vocal cords (OR 0.18, 95% CI: 0.11, 0.27).

Intrapartum amnioinfusion significantly reduced neonatal acidaemia (OR 0.42, 95% CI: 0.28, 0.62). Patients allocated to receive amnioinfusion also had a significantly lower overall Caesarean rate (OR 0.74, 95% CI: 0.59, 0.93) without increased postpartum endometritis (OR 0.47, 95% CI: 0.31, 0.72).

There were several reports of adverse events associated with amnioinfusion. It increased basal uterine tone even when a small volume (250 mL) of infusate was used. Uterine hypertonus and foetal bradycardia have been associated with specific infusion protocols, although they seem to be eliminated by adjustment of the infusion rate.

Statistically significant heterogeneity was found for the outcomes of frequency of meconium aspiration syndrome, presence of meconium below the vocal cords, and neonatal acidaemia.

The funnel plot analysis was not consistent with publication bias.

Authors’ conclusions

Ammioinfusion in cases of meconium-stained fluid significantly improves neonatal outcome, lowers the Caesarean delivery rate, and does not increase the postpartum endometritis rate.

CRD commentary

The authors stated a clear research question. The inclusion and exclusion criteria, however, were poorly reported. The literature search covered several databases but it was unclear whether there were any language restrictions, and unpublished studies were excluded.

The quality of the included studies was formally assessed but the results are not reported or discussed in the review. The authors have provided some detail about how the articles were selected and who performed the selection and data extraction, but not who performed the quality assessment.

The data extraction is not reported in either tables or the discussion in the text of the review. It is, therefore, not possible to assess any differences in participant or study design characteristics.

The studies were combined in a statistical analysis. Even though heterogeneity was statistically significant in three of the five outcomes and borderline in a fourth, the fixed-effect model was reported. The authors state that a random-
effects analysis produced similar results, but these should have been reported for the reader's own comparison.

The conclusions appear to follow from the results but should be viewed with caution due to the methodological limitations described.

Implications of the review for practice and research
The authors did not state any implications for further research or practice.

Bibliographic details

PubMedID
10808033

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Amnion; Amniotic Fluid; Cesarean Section/ statistics & numerical data; Clinical Trials as Topic; Female; Humans; Infant, Newborn; Meconium; Meconium Aspiration Syndrome/ prevention & control; Obstetric Labor Complications/ prevention & control; Pregnancy; Prospective Studies

AccessionNumber
12000001224

Date bibliographic record published
28/02/2002

Date abstract record published
28/02/2002

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.