Intrapartum amnioinfusion for meconium-stained amniotic fluid: a systematic review of randomised controlled trials
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CRD summary
This well-conducted review concluded that there is no support for the use of intrapartum amnioinfusion (AI) for women with meconium-stained amniotic fluid in standard peripartum surveillance settings, but AI appears to reduce foetal morbidity where peripartum surveillance is limited. These conclusions appear reliable and are supported by the evidence.

Authors' objectives
To determine whether intrapartum amnioinfusion (AI) reduces morbidity in the infants of mothers with meconium-stained amniotic fluid (MSAF).

Searching
MEDLINE, PubMed, EMBASE and the Cochrane Controlled Trials Register were searched from 1980 to May 2005; the keywords were reported. In addition, reference lists in studies and reviews were screened.

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

Specific interventions included in the review
Studies that compared prophylactic AI during labour with a control were eligible for inclusion. Most of the studies were conducted in clinical settings with standard peripartum surveillance; some studies were in limited peripartum surveillance settings (where electronic foetal heart monitoring was not routinely available). The studies used different rates and volumes of saline infusion (details were reported). The majority of studies used aggressive obstetric and paediatric suctioning at delivery in all patients.

Participants included in the review
Studies of women in labour with MSAF were eligible for inclusion. Women included in the review had moderate or thick/heavy MSAF.

Outcomes assessed in the review
The primary review outcome was the incidence of meconium aspiration syndrome (MAS). The secondary outcomes were acidosis at birth (umbilical artery pH <7.20), meconium below the vocal cords, overall Caesarean section rate, Caesarean section rate for foetal distress and a 5-minute Apgar score of less than 7.

How were decisions on the relevance of primary studies made?
Three reviewers independently selected the studies and resolved any disagreements through consensus.

Assessment of study quality
Validity was assessed and scored using the Jadad scale, which considers the reporting and handling of randomisation, blinding and the handling of withdrawals. Studies scoring at least 3 points out of a maximum possible score of 5 were considered to be of adequate quality. Studies scoring less than 3 points were excluded from the meta-analysis.

Three reviewers independently assessed validity and resolved any disagreements through consensus.

Data extraction
Three reviewers independently extracted the data and resolved any disagreements through consensus. Relative risks (RRs) with 95% confidence intervals (CIs) were calculated for each outcome.
Methods of synthesis
How were the studies combined?
Pooled RRs with 95% CIs were calculated using a random-effects model. A funnel plot was used to assess publication bias.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the Q statistic (taking p<0.10 to indicate significant heterogeneity) and the I-squared statistic. Analyses were stratified by level of peripartum surveillance (standard versus limited). Analyses were also repeated after including 3 low-quality studies.

Results of the review
Fifteen studies met the inclusion criteria, but only 12 adequate-quality RCTs (n=4,030) were included in the final analysis.

Four studies excluded a significant number of women after randomisation. Randomisation was performed with sealed envelopes or computer-generation. In 9 studies the outcome assessors were blinded.

All studies.

Across all setting types there were significant differences in favour of AI for MAS (RR 0.47, 95% CI: 0.22, 0.99; 12 studies) and frequency of meconium below the vocal cords (RR 0.31, 95% CI: 0.17, 0.55; 11 studies). However, in both cases there was evidence of significant statistical heterogeneity. No significant differences were found between AI and control for the risk of a 5-minute Apgar score <7 and the risk of Caesarean delivery, although for the latter there was evidence of significant statistical heterogeneity.

Standard peripartum surveillance settings.

There were no significant differences between AI and control groups for MAS (10 studies; significant heterogeneity), the incidence of a 5-minute Apgar score <7 (7 studies; no heterogeneity), and Caesarean delivery (10 studies; significant heterogeneity). However, in comparison with control, AI did significantly reduce the frequency of meconium below the vocal cords (RR 0.29, 95% CI: 0.14, 0.57; 9 studies) and neonatal acidosis (RR 0.62, 95% CI: 0.40, 0.96; 7 studies). However, in both cases there was evidence of significant statistical heterogeneity.

Limited peripartum surveillance settings.

Compared with control, AI was associated with a significant reduction in the risk of MAS (RR 0.25, 95% CI: 0.13, 0.47; 2 studies), the frequency of meconium below the vocal cords (RR 0.42, 95% CI: 0.21, 0.83; 1 study), and the incidence of a 5-minute Apgar score <7 (RR 0.36, 95% CI: 0.18, 0.72; 2 studies); there was no evidence of statistical heterogeneity. No limited peripartum surveillance studies assessed the risk of neonatal acidosis. There was no significant difference in the risk of Caesarean delivery between AI and control groups.

There was no evidence of publication bias from the funnel plot (Egger's test, p=0.137).

Authors' conclusions
There was no support for the use of AI in standard peripartum surveillance settings, but AI appeared to reduce MAS where peripartum surveillance was limited.

CRD commentary
The review question answered a clear research question. Several relevant sources were searched but no attempts to minimise publication or language bias were reported, although the potential for publication bias was assessed and no evidence of it was found. Validity was assessed using specified criteria and the results of this assessment reported. Methods were used to minimise reviewer error and bias in the study selection, validity assessment and data extraction processes. Only higher-quality studies were included in the main analyses, statistical heterogeneity was assessed, and potential sources of heterogeneity were examined. Overall, this was a well-conducted review and the authors' cautious.
conclusions appear to be supported by the evidence.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors stated that additional high-quality studies are required to confirm the review finding of the benefits of AI in clinical settings where peripartum surveillance is limited.

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