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ORIGINAL ARTICLE

Interventions at caesarean section for reducing the risk of aspiration pneumonitis

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ABSTRACT

Background: Various interventions are used as prophylaxis for aspiration pneumonitis in obstetric anaesthesia. This review, based on a Cochrane systematic review currently being updated, examines whether interventions given before caesarean section reduce the risk of aspiration pneumonitis.

Methods: Twenty-two studies, involving 2658 women providing data in a usable format for meta-analysis were identified.

Results: Compared to no treatment or placebo, there was a significant reduction in the risk of intra-gastric pH <2.5 with antacids (risk ratio (RR) 0.17, 95% confidence interval (CI) 0.09–0.32), H2 antagonists (RR 0.09, 95% CI 0.05–0.18) and proton-pump antagonists (RR 0.26, 95% CI 0.14–0.46). H2 antagonists were associated with a reduced risk of intra-gastric pH <2.5 when compared with proton-pump antagonists (RR 0.39, 95% CI 0.16–0.97), but compared with antacids the findings were unclear. Combined use of antacids plus H2 antagonists was associated with a significant reduction in the risk of intra-gastric pH <2.5 when compared with placebo (RR 0.02, 95% CI 0.00–0.15) or compared with antacids alone (RR 0.12, 95% CI 0.02–0.92).

Conclusion: The quality of evidence was weak and may not reflect a reduction in the risk of aspiration pneumonitis since none of the studies assessed substantive clinical outcomes or potential adverse effects. Further work is required to validate the suitability of surrogate markers of pH and gastric volume for clinical outcomes in the context of aspiration pneumonitis.

Keywords: Aspiration pneumonitis; Caesarean section; Antacids; H2 antagonists; Proton-pump inhibitors

Introduction

The global caesarean section (CS) rate is estimated at 15%, with rates over 20% in many developed countries, Latin America and the Caribbean.[1] Aspiration pneumonitis resulting from inhalation of gastric contents was first described as a complication of obstetric anaesthesia by Mendelson in 1964.[2] Although the incidence has decreased, largely due to the increased use of neuraxial anaesthesia for CS, it remains an important cause of maternal morbidity and mortality,[3] particularly since general anaesthesia is still required when neuraxial techniques are contraindicated or have failed. General anaesthesia remains the primary anaesthetic technique for CS in many parts of the world, and aspiration is an important contributor to maternal mortality in these settings.[4,5]

A variety of drugs are used for prophylaxis to prevent aspiration pneumonitis, which reflects the absence of an ideal regimen.[7–9] Clinical practice varies around the world. Administration of an antacid and H2 receptor antagonist, often with a pro-kinetic such as metoclopramide, has been standard practice before CS in the UK.[10] Routine administration of H2 receptor antagonists to all women in labour is also used although there is no evidence that it reduces the risk of aspiration pneumonitis should anaesthesia be required.[11] Use of pharmacological interventions should be evidence-based as they have associated costs and complications.

This paper reviews the evidence of effectiveness of pharmacological and non-pharmacological interventions

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to reduce aspiration pneumonitis for women who undergo CS. It is based on a Cochrane review, first published in 2010, but currently being updated.[12] Cochrane reviews are regularly updated as new evidence emerges and in response to feedback, and The Cochrane Library should be consulted for the most recent version of the review.

Methods

A full description of the methods has been published.[12] The Cochrane Pregnancy and Childbirth Group's (CPCG) Trials Register was searched in September 2010 using the topic list rather than keywords. The register contains studies identified from the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, hand searches of 30 journals and the proceedings of major conferences, current awareness alerts for a further 44 journals plus monthly BioMed Central e-mail alerts (CPCG 2010). No language restrictions were applied. Two authors independently screened the search results and obtained the full text of all potentially relevant studies, and two authors independently applied the inclusion criteria. Disagreements regarding eligibility were resolved by discussion between four review authors (SP, JG, GG, HKB) until consensus was reached.

All randomised controlled trials where particulate or non-particulate antacids, H2 antagonists, proton-pump antagonists, pro-kinetic drugs, or non-pharmacological interventions (such as nasogastric tube aspiration) were used specifically to prevent aspiration pneumonitis at CS were included. Comparisons between each intervention, with placebo and with no intervention were included.

Studies that did not specifically address the review question (for example those that examined the prevention of nausea and vomiting, or compared different doses of drugs), quasi-randomised trials where the method of allocation was not considered random (for example alternation, date of birth or case record number[13]), and trials where either the intervention or comparison package of care was not clearly described were excluded.

The primary outcome measures were incidence of mortality and morbidity due to aspiration pneumonitis, intra-gastric pH <2.5 and an increase of intra-gastric volume to >0.4 mL/kg, both measured after induction of anaesthesia. Secondary outcome measures were maternal satisfaction, the incidence of nausea and vomiting during CS or the postoperative period, side effects, adverse events, neonatal morbidity, breastfeeding rates, raised intra-gastric pH above 2.5 and reduction of intra-gastric volume to less than 0.4 mL/kg, both measured before extubation at the end of anaesthesia.

Two review authors independently extracted data from each study using a data extraction form designed specifically for this review. Discrepancies were resolved through discussion and consultation with a third person. Assessments of the risk of selection, attrition and selective reporting bias were made using criteria outlined in the Cochrane Handbook for Systematic Reviews of Interventions.[13]

Statistical analysis

Review Manager Software Version 5.0 was used for statistical analysis.[14] Heterogeneity was assessed using the I^2 test statistic. Fixed-effect meta-analysis was used for combining data in the absence of heterogeneity and random-effects meta-analysis was used where there was considerable heterogeneity (I^2 50% or greater). Summary risk ratios with 95% confidence intervals for dichotomous outcomes and weighted mean difference for continuous data outcomes are given. Data were analysed on an intention-to-treat basis.

Results

One hundred and sixty-four studies were initially identified in the search, and included interventions for reducing nausea and vomiting and aspiration pneumonitis at CS (Fig. 1). Sixty-four studies were excluded because they did not comply with the set inclusion criteria; reasons for their exclusion are published in the full Cochrane review.[12] Sixty-seven studies were excluded since they related only to prevention of nausea and vomiting at CS, and it is anticipated that these will be published as a separate review.[15] Thirty-three studies related to interventions for reducing aspiration pneumonitis and, of these, 22 studies involving 2658 women provided data suitable for inclusion in meta-analyses.[16–37] The

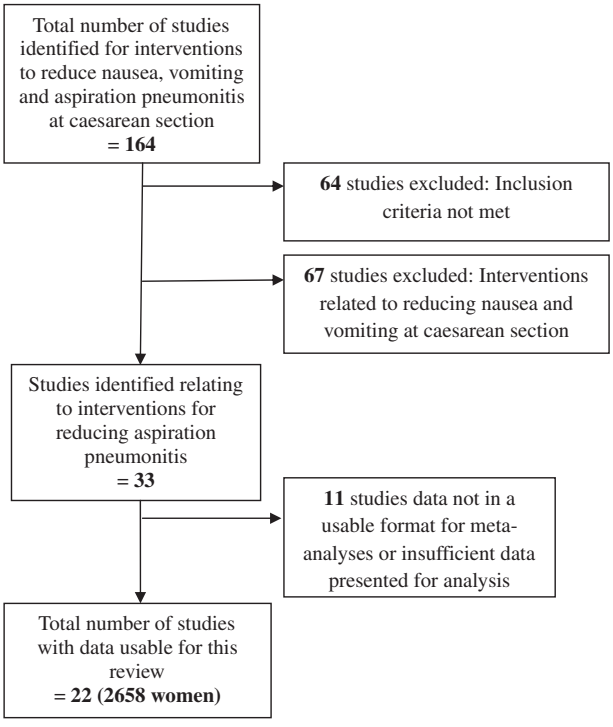

Fig. 1 Search results.