Preload or coload for spinal anesthesia for elective cesarean delivery: a meta-analysis
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CRD summary
The review found that in women who underwent elective caesarean delivery under spinal anaesthesia, the timing of fluid loading did not affect the incidence of hypotension regardless of whether colloid or crystalloid fluids were used. Although only a few small studies were available, their findings were consistent. The review was well-conducted and the authors’ conclusions appear reliable.

Authors' objectives
To determine whether the timing of fluid infusion (before or after induction of spinal anaesthesia) influenced the outcomes of elective Caesarean delivery.

Searching
MEDLINE, EMBASE and LILACS were searched from 1980 to May 2009 without language restrictions. A search for unpublished data was conducted with ClinicalTrials.gov. Search terms were reported. The reviewers checked reference lists of reviews and randomised controlled trials (RCT) retrieved and searched published abstracts from meetings of American Society of Anesthesiologists, Society of Obstetric Anesthesia and Perinatology and European Society of Anaesthesia from 2000 to 2009.

Study selection
RCTs that compared fluid administration before induction of spinal anaesthesia (preloading) in women scheduled for elective Caesarean delivery versus fluid administration at the time of induction (co-loading) were eligible for inclusion. Outcomes of interest in the review were hypotension as defined in the primary studies (primary outcome), lowest blood pressure recorded, nausea and vomiting, umbilical artery pH, total volume of fluid administered and dose of vasoconstrictor used (secondary outcomes). Studies that compared types of fluid were excluded.

Participants in the included studies received approximately 500mL to 1,000mL of colloid or 1,000mL to 1,500mL of crystalloid fluid. Vasopressors used in the studies included ephedrine, phenylephrine and metaraminol in varying doses and combinations. Study definitions of hypotension varied; most common was a 20% reduction in systolic blood pressure. Outcomes reported in the review included Apgar scores under 7 at five minutes.

Four reviewers independently selected the studies. Disagreements were resolved by consensus.

Assessment of study quality
Study quality was evaluated with a published scale (Jadad 1996) of the adequacy of reported randomisation, blinding and completeness of outcome data. Each study was scored up to a maximum of 5 points. Allocation concealment was evaluated.

Two reviewers independently assessed study validity. Disagreements were resolved by consensus.

Data extraction
Two reviewers independently extracted data. Disagreements were resolved by re-inspection.

Vasopressors were analysed as standardised units based on their dose in either milligrams or millilitres. Primary study authors were contacted for more information if required.

Methods of synthesis
A random-effects model was used to pool odds ratios for dichotomous outcomes, risk differences for the primary outcome and standardised mean differences for continuous outcomes, with 95% confidence intervals. Heterogeneity
was assessed using \( I^2 \) and \( \chi^2 \) statistics. Publication bias was assessed with a funnel plot.

Subgroup analyses were conducted to investigate the effect of type of fluid (colloid or crystalloid). A sensitivity analysis by fluid volume was planned, but not conducted as fluid volume did not vary much across studies.

**Results of the review**

Eight RCTs were included in the review (n=518, range 36 to 178). The median quality score for seven RCTs was 3 (range 2 to 5). Four RCTs were unblinded, two did not adequately describe randomisation methods and two did not describe allocation concealment.

There was no statistically significant difference between the co-load and preload groups in the incidence of hypotension, either in the main analyses (eight RCTs) or the fluid subgroups. No significant statistical heterogeneity was detected for the main analyses (\( I^2=31\% \)). There was no statistically significant difference between the groups in the lowest recorded blood pressure (six RCTs), vasopressor dose (seven RCTs), incidence of nausea and vomiting (six RCTs), umbilical artery pH (six RCTs) and incidence of low Apgar scores (seven RCTs). The \( I^2 \) value for the analysis of vasopressor dose was 83\%, but the p value for the \( \chi^2 \) statistic was not statistically significant (\( p=0.15 \)). Funnel plots did not show evidence of publication bias.

**Authors’ conclusions**

The timing of fluid loading (whether colloid or crystalloid) in patients who underwent elective caesarean delivery under spinal anaesthesia did not affect the incidence of hypotension.

**CRD commentary**

The objectives and inclusion criteria of the review were clear. Relevant sources were searched for published and unpublished studies in any language. Steps were taken to minimise the risk of reviewer bias and error by having more than one reviewer independently select studies, undertake validity assessment and extract data. Appropriate statistical techniques were used to assess study quality, combine studies, assess for statistical heterogeneity and explore differences between studies. As the authors noted, only a small amount of evidence was available and the studies differed in type and amount of loading fluids and vasopressins used. Although only a few small studies were available, they were randomised and their findings were consistent.

The review was well-conducted and the authors’ conclusions appear reliable.

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

**Practice:** The authors stated that it was unnecessary to delay surgery in order to deliver a preload of fluid among women who underwent elective Caesarean delivery under spinal anaesthesia. Prophylactic or therapeutic vasopressors may be necessary in a substantial proportion of women. The authors noted that the findings of the review may not apply to emergency situations.

The authors did not state any implications for research.

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**Bibliographic details**


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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.