Intravenous magnesium prevents atrial fibrillation after coronary artery bypass grafting: a meta-analysis of 7 double-blind, placebo-controlled, randomized clinical trials

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CRD summary
The authors concluded that intravenous magnesium significantly reduced the incidence of postoperative atrial fibrillation after coronary artery bypass grafting. The conclusions reflect the results but limitations in the review’s search and quality assessment methods coupled with an indication that the pooled results may have been affected by publication bias make the reliability of the conclusions uncertain.

Authors’ objectives
To assess the efficacy of intravenous magnesium on the prevention of postoperative atrial fibrillation after coronary artery bypass grafting.

Searching
MEDLINE, EMBASE and The Cochrane Library were searched up to August 2011 for publications in English; some search terms were provided. There was a manual search of references of relevant articles.

Study selection
Eligible studies were double-blind randomised controlled trials (RCTs) with a minimum sample size of 10 that compared magnesium with placebo in adult patients who underwent coronary artery bypass grafting. The outcome of interest was incidence of postoperative atrial fibrillation. Studies were excluded if they were published only as abstracts, did not report follow-up duration and where patients had pre-existing atrial fibrillation.

The included trials included both men and women. Mean age ranged from 56 to 65. Overall, 22% of patients had diabetes mellitus, 29% had hypertension and 47% were using beta-blockers. Total dosage of intravenous magnesium ranged from 8mmol to 100mmol. All trials reported perioperative prophylactic use of intravenous magnesium: one trial was initiated during the preoperative period, two trials during the intraoperative period and four trials during the postoperative period.

The authors did not state how many reviewers selected studies for inclusion.

Assessment of study quality
Study quality was assessed using the five-point Jadad scale of randomisation, blinding and drop-outs/withdrawals.

It appeared that two authors independently performed the quality assessment.

Data extraction
Incidence of postoperative atrial fibrillation was extracted from each study to calculate risk ratio (RR) and 95% confidence intervals (CIs).

Two reviewers independently performed the data extraction. Any disagreements were resolved through discussion and consensus.

Methods of synthesis
The studies were pooled using a fixed-effect model. Heterogeneity was assessed using the I² statistic. Subgroup analyses were done according to data collection, sampling method and duration of follow-up. Very few details were provided about the definitions of the subgroups. Publication bias was assessed using the Egger test.

Results of the review
Seven RCTs were included in the review (1,028 patients, range 50 to 345). Jadad quality scores ranged from 3 to 5. Follow-up ranged from one to five days.
Intravenous magnesium significantly reduced the incidence of postoperative atrial fibrillation compared to placebo by 36% (RR 0.64, 95% CI 0.50 to 0.83; seven trials; I²=0%). Subgroup analyses demonstrated similar results. Egger's test showed that moderate publication bias existed among the included trials.

**Authors' conclusions**
Intravenous magnesium significantly reduced the incidence of postoperative atrial fibrillation after coronary artery bypass grafting.

**CRD commentary**
The review question and inclusion criteria were clear. Relevant databases were searched. The search was restricted to publications in English, which may have introduced language bias. Unpublished material was not sought, which introduced potential for publication bias and the possibility that some studies were missed. The authors attempted to evaluate publication bias using Egger's test and there was some evidence that publication bias may have affected the pooled result. It appeared that some steps were taken to minimise reviewer error and bias. Trial quality was assessed but the method used did not assess allocation concealment and only provided a very basic evaluation of whether or not individual trial results were likely to have been subject to bias. Data were appropriately pooled.

The conclusions reflect the results, but limitations in the search and quality assessment coupled with an indication that the pooled results may have been affected by publication bias make the reliability of the conclusions uncertain.

**Implications of the review for practice and research**
**Practice**: The authors stated that the finding of this meta-analysis encouraged use of intravenous magnesium as an alternative to prevent postoperative atrial fibrillation after coronary artery bypass grafting.

**Research**: The authors stated that high quality randomised clinical trials were needed to evaluate safety.

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