



Title Intravenous Magnesium Sulphate and Sotalol for Prevention of Atrial Fibrillation after Coronary Artery Bypass Surgery: A Systematic Review and Economic Evaluation

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Reference Volume 12.28. ISBN 1366-5278. www.hta.ac.uk/project/I659.asp

Aim

To assess the clinical and cost effectiveness of magnesium sulphate compared with sotalol, and to assess the clinical effectiveness of magnesium sulphate compared with placebo in preventing atrial fibrillation (AF) in patients who have had a coronary artery bypass graft (CABG).

Conclusions and results

Twenty-two papers met the inclusion criteria for the systematic review, reporting 15 trials which all compared magnesium sulphate with placebo or control. No randomized controlled trials (RCTs) were identified that specifically aimed to compare intravenous magnesium with sotalol as prophylaxis for AF in patients undergoing CABG. Included trials ranged from 15 to 176 patients randomized, and were conducted in Europe, the USA, and Canada. The standard of reporting was generally poor, with details of key methodological attributes difficult to elucidate. No trials were identified that specifically aimed to compare magnesium sulphate with sotalol. Of 1070 patients in the pooled magnesium group, 230 (21%) developed postoperative AF, compared with 307 of 1031 (30%) patients in the placebo or (control) group. Meta-analysis using a fixed-effects model generated a pooled odds ratio (OR) that was significantly less than 1.0 (OR = 0.65, 95% confidence interval [CI] 0.53 to 0.79, test for overall effect $p < 0.0001$), indicating that intravenous magnesium is effective in preventing postoperative AF, but with statistically significant heterogeneity ($I^2 = 63.4\%$, $p = 0.0005$). AF was less likely to occur when a longer duration of prophylaxis was used, and the earlier that prophylaxis was started. However, this finding was associated with two RCTs that had more favorable results than the other trials. No clear relationship between dose and AF was observed; although a lower constant dose rate was associated with the lowest odds of AF. In the base-case analysis in the economic model, magnesium sulphate prophylaxis reduced the number of postoperative AF cases at a modest increase in cost. The results of the economic analysis are

highly sensitive to variation in certain key parameters, including the baseline risk of AF following CABG, the effectiveness and cost of prophylaxis, and the resource consequences of postoperative AF. Prophylaxis is less likely to be cost effective if it requires changes in admission routines that result in longer preoperative stays than would be the case without prophylaxis.

Recommendations

No RCTs were identified that specifically aimed to compare intravenous magnesium with sotalol as prophylaxis for AF in patients undergoing CABG. Such a comparison does not appear to be clinically meaningful. Intravenous magnesium, compared with placebo or control, is effective in preventing postoperative AF, as confirmed by a statistically significant intervention effect based on pooled analysis of 15 RCTs.

Methods

For further details see link www.hta.ac.uk/project/I659.asp.

Further research/reviews required

Further research should investigate the relationship between dose, dose rate, duration of prophylaxis, timing of initiation of therapy, and patient characteristics, eg, degree of risk for AF. This will provide stronger evidence for the optimum delivery of intravenous magnesium in patients undergoing CABG.