CME Low-dose Magnesium Sulfate Versus High Dose in the Early Management of Rapid Atrial Fibrillation: Randomized Controlled Double-blind Study (LOMAGHI Study)

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ABSTRACT

Objectives: We aim to determine the benefit of two different doses magnesium sulfate ($MgSO_4$) compared to placebo in rate control of rapid atrial fibrillation (AF) managed in the emergency department (ED).

Methods: We undertook a randomized, controlled, double-blind clinical trial in three university hospital EDs between August 2009 and December 2014. Patients > 18 years with rapid AF (>120 beats/min) were enrolled and randomized to 9 g of intravenous $MgSO_4$ (high-dose group, n = 153), 4.5 g of intravenous $MgSO_4$ (low-dose group, n = 148), or serum saline infusion (placebo group, n = 149), given in addition to atrioventricular (AV) nodal blocking agents. The primary outcome was the reduction of baseline ventricular rate (VR) to 90 beats/min or less or reduction of VR by 20% or greater from baseline (therapeutic response). Secondary outcome included resolution time (defined as the elapsed time from start of treatment to therapeutic response), sinus rhythm conversion rate, and adverse events within the first 24 hours.

Results: At 4 hours, therapeutic response rate was higher in low- and high-$MgSO_4$ groups compared to placebo group; the absolute differences were, respectively, 20.5% (risk ratio [RR] = 2.31, 95% confidence interval [CI] = 1.45–3.69) and +15.8% (RR = 1.89, 95% CI = 1.20–2.99). At 24 hours, compared to placebo group, therapeutic response difference was +14.1% (RR = 9.74, 95% CI = 2.87–17.05) with low-dose $MgSO_4$ and +10.3% (RR = 3.22, 95% CI = 1.45–7.17) with high-dose $MgSO_4$. The lowest resolution time was observed in the low-dose $MgSO_4$ group (5.2 $\pm$ 2 hours) compared to 6.1 $\pm$ 1.9 hours in the high-dose $MgSO_4$ group and 8.4 $\pm$ 2.5 hours in the placebo group. Rhythm control rate at 24 hours was significantly higher in the low-dose $MgSO_4$ group (22.9%) compared to the high-dose $MgSO_4$ group (13.0%, p = 0.03) and the placebo group (10.7%). Adverse effects were minor and significantly more frequent with high-dose $MgSO_4$.

Conclusions: Intravenous $MgSO_4$ appears to have a synergistic effect when combined with other AV nodal blockers resulting in improved rate control. Similar efficacy was observed with 4.5 and 9 g of $MgSO_4$ but a dose of 9 g was associated with more side effects.

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