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Therapeutics

ED use of magnesium sulphate improved rate control in atrial fibrillation with rapid ventricular response FREE



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Davey MJ, Teubner D. A randomized controlled trial of magnesium sulfate, in addition to usual care, for rate control in atrial fibrillation. *Ann Emerg Med* 2005;**45**:347–53. [CrossRef](#) [PubMed](#) [Web of Science](#)

Q In emergency department (ED) patients with atrial fibrillation (AF) and a rapid ventricular response rate, what is the efficacy and safety of magnesium sulphate administered within the first 2.5 hours in addition to usual care?

Clinical impact ratings IM/Ambulatory care ★★★★★☆ Emergency medicine ★★★★★☆ Cardiology ★★★★★☆

METHODS

Design:

randomised controlled trial (RCT).

Allocation:

{concealed*}†.

Blinding:

blinded (patients, clinicians, {data collectors, outcome assessors, monitoring committee}†, and data analysts).*

 **Follow up period:**

up to 150 minutes.

 **Setting:**

2 academic, tertiary referral EDs in South Australia.

 **Patients:**

199 patients (approximately 52% women) >18 years of age who presented to the ED with AF and a ventricular response rate >120 beats/min. Exclusion criteria were haemodynamic instability, history of renal failure or atrioventricular node disease (except for patients with primary atrioventricular block or permanent pacemakers), or acute myocardial infarction with electrocardiographic criteria for thrombolysis.

 **Intervention:**

magnesium sulphate, 40 mEq (5 g, 20 mmol), in 100 ml 5% dextrose solution, with 20 mEq (2.5 g, 10 mmol) given intravenously over 20 minutes, followed by the remaining 20 mEq over the next 2 hours (n=102); or an equivalent volume of 5% dextrose solution at the same infusion rates (placebo) (n=97).

 **Outcomes:**

ventricular response rate control (pulse rate <100 beats/min), mean changes in pulse rate, conversion to sinus rhythm, and major (hypotension and bradycardia) or minor adverse events.

 **Patient follow up:**

95% were included in the primary outcome analysis (intention to treat).

MAIN RESULTS

Patients who received magnesium sulphate were more likely to achieve a pulse <100 beats/min, convert to sinus rhythm, and have an adverse event (mostly minor events such as flushing and nausea) than those who received placebo (table).

Magnesium sulphate (MS) v placebo in emergency department patients with atrial fibrillation and rapid ventricular response rate*

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CONCLUSIONS

In emergency department patients with atrial fibrillation and a rapid ventricular response rate, the addition of magnesium sulphate to usual care improved ventricular response rate control and conversion to sinus rhythm, with some increased risk of adverse events.

Commentary

There are relatively few RCTs to inform decision making about acute control of rapid AF. However, evidence syntheses and guidelines suggest that calcium channel blockers and β blockers are superior to digoxin with their more rapid onset of action and ability to control heart rate during exercise.^{1,2} These agents are now the standard of care in the management of rapid AF.³ Herein lies a considerable barrier to the generalisability of the Australian study by Davey *et al* that began to enrol patients >5 years ago. Approximately 80% of enrolled patients received digoxin as the antiarrhythmic of choice; $\leq 10\%$ received either a calcium channel blocker or a β blocker. In light of digoxin's generally slower effect on rate control and the hypotensive properties associated with more standard drugs, the efficacy and side effect profile of magnesium combined with these other agents for slowing AF is unknown.

Another important caveat relates to the reported doubling of rates of conversion to sinus rhythm associated with magnesium use. Although CIs around this estimate of efficacy are wide, it is important to consider this property as a potentially adverse effect, mediated through embolic stroke risk, when aiming for rate control in patients with >24 hours of AF symptoms. Indeed, when encountering patients with rapid AF, clinicians must consider whether cardioversion is safe or whether rate control is the priority and tailor subsequent management appropriately.

This methodologically sound study by Davey *et al* suggests a 30% absolute increase in magnesium's ability to reduce heart rate to <100 beats/min. However, magnesium resulted in a mean reduction (adjusted) of only 10.6 beats/min (95% CI 2.3 to 18.9), short of the authors' predetermined clinically significant decrease of 15 beats/min. Magnesium has potential as an adjunct to antiarrhythmic therapy in the control of rapid AF. However, because this is the only study to examine the benefit of magnesium as an adjunct to standard therapy for rapid AF in an ED setting, evidence is insufficient to support its routine use.

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3. [↵](#) Diner BM, Ratcliff JJ, Pitts SR. *et al. Canadian Journal of Emergency Medicine* 2004;**6**:145–6. [Google Scholar](#)

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Footnotes

↵*: *See glossary.

↵†: Information provided by author.

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