

Charles Graffeo, MD  
 Eastern Virginia Medical School  
 Emergency Medicine Journal Club  
 February 25, 2008

**P: In ED patients with new onset A-fib**  
**I: Does the use of parenteral Magnesium Sulfate**  
**C: Compared or in addition to usual standard of care (Ca channel & B-blockers, Digoxin)**  
**O: Result in faster time to rate control or conversion to sinus rhythm.**

Clinical Scenario:

58 y/o M presented to the ED with new onset of palpitations. ECG reveals evidence of A-fib with a ventricular rate of 140. No hx of CAD, though patient admits to a hx. You ask nurse to start a cardizem drip after a bolus and your attending suggests that beginning with a Mg sulfate infusion may help “move things along” and improve rate or possibly rhythm conversion.

Search Strategy: Pubmed, Cochrane collaboration, Trip Database, Ovid,

Author, Date, Country	Patient Group	Study Type	Outcomes	Key Results	Limitations
Kwok M, <u>Heart</u> 2007, 93: 1433-1440 Use of intravenous magnesium to treat acute onset atrial fibrillation	515 patients in 10 studies/6 countries 3 ED studies 3 ICU studies 3 Floor studies  Up to 7 days Excluded SVT flutter other rhythms  Included Joshi 1995 article of pts. With avg age 36 yrs. Due to rheum. Heart dx.	Meta-analysis of 10 RCT's (Jadad score 3.5) N=515 5 compared Mg to placebo (4 used digoxin, 1 ibutilide) 3 compared to Ca antagonists 2 compared to amiodarone	Proportion of patients converting to sinus in 24 hours  Proportion of patients whose ventricular response was <100  Side effects: Flushing, hypotension, av blocks,	6 reported nl baseline Mg. No difference in sinus conversion (OR 1.2) dig or Ca blockers.  Dig + Mg improved rate control (OR 3.23) Mg less effective rate control than Ca blockers Mg appeared to have no “harms” 17 % flushing no bp issues	Wide dose range 3-10 g. What's effective dose?  > 50% of patients got digoxin other gents varied doses.  No comparison of Ca channel with and w/o Mg  3 unblinded studies, 32 pts unaccounted for  did not adjust / comment nl vs abnl. Mg levels
Onalan O Meta-analysis of magnesium therapy for the acute management of rapid atrial fibrillation <u>Am. J. of Card.</u> 2007;99:1726-1732	476 patients in 8 RCT's 7 reported in Kwok article  All had underlying heart disease (CAD, CMP, HTN, LAD)	8 RCT's prospective 3 unblinded Jadad score 3.0 (range 1-5) Comparisons included Mg vs. Placebo(3) Ca channel (3) Amiodarone(1) Ajamiline (1a)	Primary: Rate control <100, Rhythm control Secondary: Time to response (hrs.) Risk of adverse effects	Mg more effective than placebo in achieving rate control (OR 2.97) in 3 studies (n=258) less effective than Ca channel blocker (rate) Conversion better than Ca channels (OR 1.60) Mg. Safety profile appears OK	Wide dose range (1.2-5g initial 1-30 min.).  Pooling of studies within analysis.  Very heterogenous studies

<p>Davey MJ A randomized controlled trial of magnesium sulfate, in addition to usual care, for rate control in atrial fibrillation <u>Ann of Emerg. Med</u> 2005; 45:347-53</p>	<p>N=199 (52% women) Tertiary referral Australia AF with HR&gt;120. Clinically unstable, RF, AMI excluded</p>	<p>RCT, Allocation concealed, (Jadad score 5) Blinded (clinicians, physicians, data entry, outcome assessors) Placebo vs. 5.0g first 2.5 over 20 min then 2.5 over 2 hrs.</p>	<p>Outcomes: Ventricular response rate &lt;100, mean changes in pulse rate, conversion to sinus rhythm, and major (hypotension bradycardia) adverse events or minor adverse events.  95% f/u + Intention to treat</p>	<p>Rate control: &lt;100 bpm. Mg 65% vs. 34% or 31% RR(95%CI 25-141) , NNT 4 (3-12) Rhythm conversion: 27% vs 12% ARR 15% (95%CI 5-303) NNT 8 ((3-166)  Adverse events 15% vs. 5%(placebo)</p>	<p>Patient enrollment dates back to 2005. Over 80% got digoxin as arrhythmic of choice &lt;10% got Ca channel blocker.  Methodologically Good study  Is improvement in conversion desirable</p>
---	---	---	---	--	---

### **Clinical Bottom Line**

The strength of evidence in support of the use of parenteral magnesium sulfate is insufficient to make an informed decision regarding its use in the clinical setting of atrial fibrillation with a rapid ventricular response. There appears to be some evidence that it may serve as a potential adjunct to anti-arrhythmic therapy when treating those with rapid a-fib in an ED setting and as an adjunct to the use of Digoxin for improved rate and rhythm control. Clinicians must be cautious when considering rhythm conversion as there are harms associated with converting those who have been in a-fib for sustained periods of time. Otherwise, Mg appears to have a reasonably good safety profile.

### **References:**

Kwok M Ho, David J Sheridan, and Timothy Paterson **Use of intravenous magnesium to treat acute onset atrial fibrillation: a meta-analysis**, Heart 2007; 93: 1433-1440

Onalan O, Crystal E, Daoulah A, Lau C, Crystal A, Lashevsky I. **Meta-analysis of magnesium therapy for the acute management of rapid atrial fibrillation**. Am J Cardiol. 2007 Jun 15;99(12):1726-32. Epub 2007 Apr 26.

Davey MJ, Teubner D, **A randomized controlled trial of magnesium sulfate, in addition to usual care, for rate control in atrial fibrillation** Ann of Emerg. Med 2005; 45:347-53