

IS THERE EVIDENCE TO SUPPORT THE USE OF IV MAGNESIUM IN ATRIAL FIBRILLATION?

Fact or Fiction?



"... at present, the available data would suggest that magnesium, as an adjunct to electric cardioversion or for prevention, **is more myth** than a practical, easy (or magical) solution to the growing problem of AF."

2017 Systematic Review Evidence

"Magnesium administration post-cardiothoracic surgery appears to reduce AF without significant adverse events."



Optimal timing = postoperative with duration >24h, doses up to 60mmol, administered as boluses



Insufficient evidence supporting magnesium therapy for treatment or prophylaxis of other arrhythmias



"Magnesium **was inferior** to β -blockers and amiodarone in preventing postoperative atrial fibrillation/flutter (POAF), which is consistent with the findings in cardiac surgery"

2016

Canadian Cardiovascular Society Guideline



"We suggest that patients who have a contraindication to β -blocker therapy and amiodarone before or after cardiac surgery be considered for prophylactic therapy to prevent POAF with intravenous magnesium"

(Conditional Recommendation, Low-Quality Evidence)

2014

NICE Clinical Guideline



"Do not offer magnesium or a calcium-channel blocker for pharmacological cardioversion"

Why not?

The Guideline Development Group (GDG) determined that Magnesium was more clinically effective than calcium channel blockers but **less effective than placebo**. Therefore, the GDG considered these drugs showed harm and should not be used for cardioversion."

2013

Cochrane systematic review: "The ability of magnesium to prevent atrial fibrillation may be slightly less than that of the other pharmacological agents."

Is there evidence to support the use of IV magnesium in Atrial Fibrillation?

Fact or Fiction?

*“Further trial data may shed light on whether there is any role for magnesium in improving the management of patients with AF. However at present, the available data would suggest that magnesium, as an adjunct to electric cardioversion or for prevention, is **more myth** than a practical, easy (or magical) solution to the growing problem of AF.”*

Key discussion paper

Magnesium for atrial fibrillation, myth or magic?

This discussion paper provides an overview of recent evidence regarding the role of magnesium in either successful cardioversion or improved prevention of AF. The author, Dipak Kotecha, suggests that the evidence is fraught with patient selection bias, sample size issues, and confounders in observational studies. Kotecha notes that three new clinical trials are either currently recruiting or waiting the reporting of results, and while these may shed light on a role for magnesium in the future, he believes the current evidence indicates no benefit.

Source: [Circulation: Arrhythmia and Electrophysiology](#) 2016; 9: e004521

Recent evidence

2017

Systematic review (context: cardiothoracic surgery, magnesium given postoperatively):

The findings of a review undertaken of magnesium therapy as prophylaxis or treatment of postoperative arrhythmias in cardiac surgery were:

- “Magnesium administration post-cardiothoracic surgery appears to reduce AF without significant adverse events”
- the optimal timing found to be postoperative with duration >24h, doses up to 60mmol, administered as boluses
- Insufficient evidence supporting magnesium therapy for treatment or prophylaxis of other arrhythmias

Source: [Journal of Critical Care](#) 2017; 42: 69-77

2017

Network meta-analysis evidence (context: thoracic surgery, magnesium given perioperatively):

“Magnesium supplementation during the perioperative period reduces the incidence of postoperative atrial fibrillation/flutter(POAF) after thoracic surgery without obvious adverse effects. Our network meta-analysis showed that magnesium was inferior to β -blockers and amiodarone in preventing POAF, which is consistent with the findings in cardiac surgery.”

Source: [Chest](#) 2017; 151(1): 149-159

2016

Canadian Cardiovascular Society Guideline:

Recommendation: IV magnesium could be considered for patients with a contraindication to β -blocker therapy and amiodarone:

“We suggest that patients who have a contraindication to β -blocker therapy and amiodarone before or after cardiac surgery be considered for prophylactic therapy to prevent POAF with intravenous magnesium (Conditional Recommendation, Low-Quality Evidence) or colchicine (Conditional Recommendation, Low-Quality Evidence) or with biatrial pacing (Conditional Recommendation, Low-Quality Evidence).”

Evidence basis for guideline recommendation:

“A recent systematic review of 21 trials, none particularly large, using intravenous magnesium in 2988 patients, reported a reduction in POAF from 26.2% to 16.5% (OR, 0.55; 95% CI, 0.41-0.73). Considerable heterogeneity was noted, on the basis of varied dosing regimens. The use of intravenous magnesium remains conditionally recommended, as in 2011, except that the quality of evidence has been downgraded to low.”

(This recommendation is based on the most recent [Cochrane Review](#))

Source: [Canadian Journal of Cardiology](#) 2016; 32 (10): 1170-1185

2016

2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS (context: prevention of postoperative AF):

“Despite initial reports from meta-analyses, pre-operative treatment with statins did not prevent post-operative AF in a prospective controlled trial. Other therapies have also been studied in small, hypothesis-generating trials, but have not demonstrated clear beneficial effects. These include magnesium, n-3 polyunsaturated fatty acids, colchicine, corticosteroids, and posterior pericardectomy.”

Source: [European Journal of Cardio-Thoracic Surgery](#) 2016; 50(5): e1-e88

2014

NICE Clinical Guideline - Atrial fibrillation: management

Recommendation: “Do not offer magnesium or a calcium-channel blocker for pharmacological cardioversion”.

Evidence basis for guideline recommendation:

“Magnesium was more clinically effective than calcium channel blockers but less effective than placebo. Therefore, the GDG (Guideline Development Group) considered these drugs showed harm and should not be used for cardioversion.”

Source: [NICE](#) 2014

2013

Cochrane systematic review (context: prevention of postoperative AF):

This review examined the use of magnesium for atrial fibrillation as well as other pharmacological agents. The review authors concluded: “Each of the studied interventions significantly reduced the rate of post-operative atrial fibrillation after cardiac surgery compared with a control...The ability of magnesium to prevent atrial fibrillation may be slightly less than that of the other pharmacological agents”

Source: [Cochrane Database of Systematic Reviews](#) 2013; 1 CD003611

2012

Meta-analysis (context: AF post coronary artery bypass grafting):

A meta-analysis conducted by Gu et al. (see source below) concluded that intravenous magnesium significantly reduced the incidence of postoperative atrial fibrillation after coronary artery bypass grafting.

Source: [Trials 2012; 13\(41\)](#)

This review was later appraised by the *Centre for Reviews and Dissemination* which stated:

“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.” ([full appraisal summary available here](#))

Further summarised evidence:

UpToDate recommendations

Topic authors list magnesium as an ineffective therapy and therefore do not recommend it as a strategy for either the prevention or suppression of atrial arrhythmias.

Sources: Lee R. [Atrial fibrillation and flutter after cardiac surgery](#); Saperia, GM ed. UpToDate. Waltham, MA: UpToDate Inc. <http://www.uptodate.com>

Kumar K et al. [Antiarrhythmic drugs to maintain sinus rhythm in patients with atrial fibrillation: Clinical trials](#). Saperia, GM ed. UpToDate. Waltham, MA: UpToDate Inc. <http://www.uptodate.com>.