IV Potassium and Magnesium an Acute Treatment for AF?

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The probability of spontaneous conversion to sinus rhythm (SVC) was increased with the intravenous administration of magnesium and potassium in patients with nonpermanent atrial fibrillation presenting to the ER, a new registry study shows.

Compared with no treatment, potassium and magnesium administration was associated with a 10% higher rate of SVC.

The finding suggests that giving intravenous potassium and magnesium might lessen the need for antiarrhythmic therapy and the associated potential adverse effects in patients with nonpermanent atrial fibrillation, the study authors say.

Still, they add, "The results of our study have no direct implications for clinical practice in the management of care for patients with AF or AFL [atrial flutter] in the ED. The findings are purely exploratory and hypothesis-generating but could potentially provide a rationale for an appropriate prospective trial."

The study was published online October 19 in *JAMA Network Open.*

"Atrial fibrillation (AF) is becoming an increasing burden for health care systems worldwide owing to population aging," write Filippo Cacioppo, MD, and colleagues from Medical University of Vienna, Vienna, Austria.

"Pharmacologic and electrical conversion are common therapies in emergency departments (EDs), especially for highly symptomatic patients. Each intervention has specific risks, and neither is considered cost-effective owing to frequent recurrence of AF. In addition, AF often terminates spontaneously," Cacioppo and colleagues write.

They add that evidence suggests hypokalemia and hypomagnesemia contribute to AF development, and so the administration of potassium and magnesium could be a reasonable strategy to improve SCV rates.

To test their hypothesis, Cacioppo et al conducted a registry-based cohort study in all patients with AF or AFL presenting to their center's ED between February 6, 2009, and February 16, 2020.

During this time, they observed a total of 2546 episodes of nonpermanent AF. The median patient age was 68 years (interquartile range [IQR], 58 - 75 years). Most were men (n = 1411 patients, 55.4%).

In addition, there were 573 episodes of nonpermanent AFL. The median patient age was 68 years (IQR, 58 - 75 years), and 332 patients (57.9%) were men.

Intravenous potassium and magnesium were administered in just over half (n = 1763, 56.5%) of the episodes.

The median amount of potassium and magnesium was delivered via one 250-mL infusion bag, which consisted of 24 mEq potassium and 145.8 mg magnesium combined with 500 mL of balanced crystalloid fluid containing 2.5 mEq potassium and 18.2 mg magnesium, administered for 90 minutes, the authors write.

If patients experienced pain at the injection site, the infusion rate was reduced until the pain subsided.

Conversion to sinus rhythm was considered spontaneous if no attempt at pharmacologic rhythm control was made until conversion occurred; if SVC occurred after an unsuccessful attempt at electrical cardioversion; or following rate control with beta-blockers, nondihydropyridine calcium channel blockers, or digitalis glycosides, the authors state.

IV Treatment Increased Odds of SVC

The median duration of stay in the ED was 6.4 hours (IQR, 3.9 - 11.6 hours) for patients with AF and 6.1 hours (IQR, 3.9 - 11.8 hours) for patients with AFL.

During the stay in the ED, SCV occurred in 15.4% (n = 393) of AF episodes and 12.7% (n = 73) of AFL episodes.

Intravenous potassium and magnesium increased the possibility of SVC compared with no IV potassium and magnesium in AF, but not in AFL.

In episodes of AF, administration of intravenous potassium and magnesium was associated with 19.2% increased odds of SVC, compared with 10.4% with no administration (odds ratio [OR], 1.98; 95% CI, 1.53 - 2.57).

In contrast, for AFL, no association was observed for the probability of SCV with potassium and magnesium administration when compared with no administration (13.0% vs 12.5%; OR, 1.05; 95% CI, 0.65 - 1.69).

Not in the Guidelines

"To date, it is unclear whether potassium and magnesium administration might be reasonable in the acute treatment of AF and AFL, and although this intervention may be common practice in some EDs, it is not part of the treatment recommendations in current guidelines," Cacioppo and colleagues write.

"Our findings suggest that intravenous potassium and magnesium administration may increase the chance of SCV in patients with AF with either hypokalemia or with plasma potassium levels in the range of 3.50 to 3.99 mEq/L. In patients with AFL, however, potassium and magnesium administration may not be associated with SCV probability," they write.

Cacioppo et al add that in their study, IV administration of potassium and magnesium was associated with SCV only in patients with symptom onset of less than 48 hours, suggesting a time-dependent outcome. However, they caution, "because only a limited number of patients with SCV had symptom onset greater than or equal to 48 hours, this finding warrants further investigation."

A Band-Aid Approach

"I'm a little skeptical about this study," Georgios Syros, MD, director of arrhythmia services at Mount Sinai Queens and Mount Sinai Brooklyn, New York City, told *theheart.org | Medscape Cardiology*.

Georgios Syros

"Atrial fibrillation is a chronic disease. The natural history of this disease is that it is paroxysmal in the beginning, and at some point the episodes become more frequent and longer in duration. For some people, at some point, it becomes permanent," Syros said.

"Suppose I cut my finger while slicing bread. I put a Band-Aid on the cut. That doesn't mean I have fixed it, it means I've helped it temporarily. Atrial fibrillation in this paper is very analogous," he said. "The patient may have episodes, goes to the emergency room, you give them medication, and temporarily alleviate the situation so that the patient does not have to be admitted. It's simple, inexpensive, you make the heart rate go back to normal, not permanently, with few side effects, except perhaps for some pain at the injection site, but that doesn't mean you have fixed the AFib permanently. But for someone who has had a first incidence, or doesn't want to stay in the hospital because it's the weekend, yes, you can use this as a Band-Aid," he said.

Intravenous potassium and magnesium, as proposed in the current study, is similar to a medication currently in use in Europe, called vernakalant, Syros said.

"Vernakalant is not FDA approved in the US. It is not meant to treat atrial fibrillation permanently, so we have to inform the public about the limitations of what we are doing," he said. "Vernakalant is similar to IV potassium and magnesium, as given in this study, but it is more expensive. It temporarily allows people to go back to sinus rhythm, but it's not going to be there forever and you may go back to permanent AFib, so this is not magic, unfortunately."

Syros emphasized that the current study results apply only to cases of paroxysmal atrial fibrillation of less than 48 hours duration. "This is a very important distinction," he said.

"For example, a patient who drank a lot and the day after is in AFib, with what we call holiday heart, would be a good candidate for the treatment in this study. He's young, without any heart damage, no diabetes, no hypertension, no prior stroke, so sure, help him out with potassium and magnesium, provided that he can prove to us that this started within 48 hours," Syros said.

Cacioppo et al and Syros report no relevant financial relationships. Study corresponding author Jan Niederdoeckl, MD, PhD, obtained funding for the study.

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