

## Editorial



# External Electrical Cardioversion is an Easy and Safe Intervention for Rhythm Control in Persistent Atrial Fibrillation

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## OPEN ACCESS

**Received:** Mar 27, 2020

**Accepted:** Apr 6, 2020

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The contents of the report are the author's own views and do not necessarily reflect the views of the *Korean Circulation Journal*.

### Conflict of Interest

The author has no financial conflicts of interest.

▶ See the article "Efficacy and Safety of Outpatient Clinic-based Elective External Electrical Cardioversion in Patients with Atrial Fibrillation" in volume 50 on page 511.

Atrial fibrillation (AF) is the most common arrhythmia in the world. AF is independently associated with increased risk of all-cause mortality and morbidities, such as heart failure (HF) and stroke.<sup>1-3)</sup> Even though there is controversy about superiority of rhythm or rate control in AF patients, the presence of sinus rhythm is an important determinant of survival.<sup>4)</sup>

Rhythm control strategies include antiarrhythmic drugs, electrical cardioversion (ECV), and catheter ablation. Catheter ablation of AF is more effective in restoring and maintaining sinus rhythm compared to antiarrhythmic drugs, but it is expensive and invasive. So, catheter ablation is recommended as second-line treatment after failure of or intolerance to antiarrhythmic drug therapy.<sup>5)</sup> ECV is the delivery of energy that is synchronized to the QRS complex during the cardiac cycle. Since external ECV was introduced into clinical practice in the early 1960s,<sup>6)</sup> it has become a routine procedure to restore sinus rhythm in patients with persistent AF. Currently, ECV of AF is recommended in symptomatic patients with persistent or long-standing persistent AF as part of rhythm control therapy.<sup>5)</sup>

In a recent retrospective study published in the *Korean Circulation Journal*, Son et al.<sup>7)</sup> reported valuable information on the efficacy and safety of outpatient clinic-based ECV, including short-term ( $\leq 3$  months) and long-term rhythm ( $> 3$  months) outcomes, and factors associated with rhythm outcomes. This study included 1,718 patients, mostly with long-standing persistent AF (90.9%). Most patients were prescribed anti-arrhythmic drugs at least 1 month before ECV. The authors placed adhesive pre-gelled pads in an anterior-posterior position, and delivered shock energy sequentially (70-100-150-200-250 J) under general sedation until successful cardioversion. Success rate was 88.6% and complication rate was 0.47% (0.18% of strokes or transient ischemic accidents, and 0.29% of sinus node dysfunction). Early recurrence of AF (within 3 months) occurred in 55.5% of the patients. Amiodarone use was independently associated with preservation of sinus rhythm within 3 months (54% reduction of the risk of AF recurrence). Baseline HF was revealed as a significant protective factor against long-term AF recurrence.

In this study by Son et al.,<sup>7)</sup> successful mean ECV energy was 144 J in all patients. Considering the study protocol of a sequential increase in delivered energy from 70 J provides important

evidence for starting ECV with 150 J for “one shot, one kill”. In addition, mean AF duration was significantly different by the outcomes within 3 months: 15.0 months in patients with remaining sinus rhythm, 25.7 months in patients with recurrence of paroxysmal AF, and 50.7 months in patients with recurrence of sustained AF;  $P = 0.003$ ). So, we should decide and perform rhythm control as soon as possible when we meet patients with newly detected AF because AF begets AF.

Usually we do not know the underlying sinus node function of persistent AF patients. However, we can evaluate this after ECV. Recently, Hwang et al. reported long-term prognosis of rhythm control using catheter ablation in patients with AF and sinus node dysfunction.<sup>8)</sup> So, if we determine the underlying sinus node function of persistent AF patients after ECV, we can predict long-term prognosis for rhythm control and consider a therapeutic plan, such as catheter ablation and/or permanent pacemaker according to the presence of sinus node dysfunction.

Interestingly, baseline HF is associated with better long-term prognosis for rhythm control in the present study. Restoring sinus rhythm in patients with persistent AF and HF has been shown to improve left ventricular function, functional capacity, and HF symptoms.<sup>9)</sup> A previous study has explained the association between structural and functional changes in the heart and rhythm control of AF; maintenance of sinus rhythm after cardioversion significantly reduces left atrial dimension and left ventricular mass index, especially in patients with left ventricular dysfunction or dilated left atrium.<sup>10)</sup> Many physicians hesitate to perform rhythm control for patients with persistent AF and HF. However, these lines of evidence support performing rhythm control actively in these patients. Thus, ECV can be the first treatment modality for rhythm control in patients with persistent AF and HF.

In conclusion, ECV is an easy and safe treatment for rhythm control in patients with persistent AF. Therefore, we can consider and choose ECV as the first-line option of rhythm control in patients with persistent AF. We should always keep in mind that sinus rhythm is better than AF.

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