

Rhythm Control With Electrocardioversion for Atrial Fibrillation and Flutter

EBEM Commentator Contact

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SYSTEMATIC REVIEW SOURCE

This is a systematic review abstract, a regular feature of the *Annals'* Evidence-Based Emergency Medicine (EBEM) series. Each features an abstract of a systematic review from the Cochrane Database of Systematic Reviews and a commentary by an emergency physician knowledgeable in the subject area.

The source for this systematic review abstract is: Mead GE, Elder AT, Flapan AD, et al. Electrical cardioversion for atrial fibrillation and flutter. *Cochrane Database Syst Rev.* 2005;(3): CD002903.

The *Annals'* EBEM editors helped prepare the abstract of this Cochrane systematic review, as well as the Evidence-Based Medicine Teaching Points.

OBJECTIVE

To assess the effects of electrocardioversion of atrial fibrillation and flutter on future risk of thromboembolic events, strokes, and mortality (primary outcomes), the rate of cognitive decline, use of anticoagulants, and risk of rehospitalization (secondary outcomes) in adults.

DATA SOURCES

The Cochrane Central Register of Controlled Trials was searched up to May 2004, as well as the following electronic databases: MEDLINE (1996 to 2004), EMBASE (1980 to 2004), CINAHL (1982 to 2004), proceedings of the American College of Cardiology published in the *Journal of the American College of Cardiology* (1981 to 2002), <http://www.trialscentral.org>, <http://www.controlled-trials.com>, and reference lists of articles. Several cardiology journals were also hand searched for abstracts of conference proceedings. Experts were personally contacted and no language restriction was applied.

STUDY SELECTION

Studies with participants older than 18 years and with paroxysmal, sustained, or permanent atrial fibrillation or flutter were considered for this review. Randomized controlled trials or controlled clinical trials of electrocardioversion plus routine care versus routine care only were included. Routine care included any

combination of anticoagulants, antiplatelet drugs, and drugs for rate control. Trials including new-onset atrial fibrillation after cardiac surgery, pharmacological cardioversion as the initial intervention, and use of implantable defibrillators were excluded.

Primary outcome variables were annual risk of stroke, peripheral embolism, and death. Secondary outcome variables were cognitive decline, quality of life, anticoagulant use, rehospitalization rates, and sinus rhythm at follow-up.

DATA EXTRACTION AND ANALYSIS

Reviewers independently searched the data sources listed above. The quality of the trials in terms of methodology was assessed by each of the reviewers and a consensus reached about inclusion. Study-quality assessment was based on randomization method and blinding of outcome assessment.

For dichotomous variables, odds ratios were calculated and reported with 95% confidence intervals; for quality of life, the weighted mean difference was calculated and included 95% confidence intervals. Heterogeneity was assessed with the Mantel-Haenszel χ^2 test; a random-effects model was used to combine results.

MAIN RESULTS

The search strategy identified 3 completed trials of electrocardioversion versus rate control (Rate Control versus Electrical Cardioversion for Persistent Atrial Fibrillation,¹ Strategies of Treatment of Atrial Fibrillation,² and How to Treat Chronic Atrial Fibrillation³), with a total of 927 participants and 1 ongoing trial (Japanese Rhythm Management Trial for Atrial Fibrillation: J-RHYTHM). Description of studies is tabulated in [Table 1](#).

CONCLUSIONS

Meta-analysis of the pooled data indicates that although electrocardioversion in sustained atrial fibrillation may improve quality of life, there was a tendency toward an increased stroke risk in comparison to rate control.

Table 1. Description of studies included in the Cochrane review.

Study	Description of Participants	Design	Quality of Evidence
RACE, 2002	N=522, recurrence of AF or flutter after at least 1 successful cardioversion, mean duration of AF 337 days	Multicentered RCT	High
STAF, 2003	N=200, AF >4 weeks but <2 y duration or ≥1 previous cardioversion with arrhythmia recurrence	Multicentered RCT	High
HOT CAFE, 2004	N=205, persistent AF in patients aged 50–75 y. AF present for >7 days but <2 y	Multicentered RCT	High

RACE, Rate Control versus Electrical Cardioversion for Persistent Atrial Fibrillation; *AF*, atrial fibrillation; *RCT*, randomized controlled trial; *STAF*, Strategies of Treatment of Atrial Fibrillation; *HOT CAFE*, How to Treat Chronic Atrial Fibrillation.

Table 2. Results of meta-analysis (N=927).

Outcome Measures	Summary Effects	Conclusions/Comments
Primary endpoints		
Death	OR=0.83 (0.48–1.43)	Inconclusive
Stroke	OR=1.90 (0.99–3.64)	Inconclusive; perhaps an increased risk of stroke in the rhythm control group
Peripheral embolism	OR=0.73 (0.16–3.28)	Inconclusive
Secondary endpoints		
Arrhythmia at follow-up	OR=0.09 (0.03–0.34)	Significantly less atrial fibrillation in the rhythm control group
Quality of life	N/A	Reported only in STAF and RACE trials. Scores significantly higher in rhythm control group for the following indicators: physical function, physical role function, vitality.
Physical function	WMD=6.35 (3.26–9.45)	Significantly higher in the rhythm control group
Vitality	WMD=3.67 (1.16–6.18)	
Rehospitalization	1.24 (0.31–4.85)	Inconclusive
Use of anticoagulation	RACE: 86%–99% in the rhythm control group vs 96%–99% in the rate control group. STAF: Data not reported. HOT CAFE: Greater than 4 weeks in 15.6% of electrically cardioverted patients vs 74% in the rate control group.	Use of anticoagulants not significantly different in RACE; use of anticoagulant significantly higher in rate control group in HOT CAFE study.

OR, odds ratio; WMD, weighted mean difference.

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COMMENTARY: CLINICAL IMPLICATION

Atrial fibrillation is the most common dysrhythmia cared for in the emergency department (ED).⁴ There are multiple underlying causes, including valvular and ischemic heart disease, pulmonary and endocrine disorders, and lone atrial fibrillation, in which no underlying cause is found. With the increasing incidence and prevalence, emergency physicians can expect to encounter more patients with atrial fibrillation.

Electrocardioversion for atrial fibrillation was first described in 1962 by Lown et al.⁵ Since then, it has been a mainstay in the treatment of atrial fibrillation. Advances have included an improved understanding of optimizing success rates by using anterior-posterior lead placement⁶ and more recently by using a

biphasic wave form that reduces thoracic impedance and improves conversion rates from 85% to 95%.⁷ A better understanding of the risk of thromboembolism has also evolved, and current American Heart Association guidelines recommend a transesophageal echocardiogram or course of warfarin before electrocardioversion in those with a duration of atrial fibrillation greater than 48 hours.⁸ For those with less than 48 hours of atrial fibrillation, cardioversion (electrical, chemical, or spontaneous) carries an embolism risk less than 1%.⁹

This Cochrane review addressed the effectiveness of electrocardioversion compared with a strategy of rate control on mortality, symptoms, and subsequent stroke in patients with “acute atrial fibrillation” (Table 2). The mean age was more than 60 years and the mean duration of atrial fibrillation was more than 200 days in the 3 studies included in this review. Thus, this is an analysis of the role of electrocardioversion in patients older than 60 years and with sustained atrial fibrillation. In this setting, no difference was found in embolic events when rhythm control was compared with rate control. Three of 8 quality of life indicators (physical functioning, physical role

function, and vitality) show improvement with electrical rhythm control, whereas the others did not. No differences in stroke or transient ischemic attack frequency were identified in the studies included in the Cochrane review. Analysis of cause-specific mortality in the Analysis of Cause-Specific Mortality in the Atrial Fibrillation Follow-up Investigation of Rhythm Management trial also showed no significant difference in the incidence of strokes or transient ischemic attacks in treatment approach, electrocardioversion, or pharmacologic rate control.

TAKE-HOME MESSAGE

This review provides little evidence on which emergency physicians can base decisions about patients with acute atrial fibrillation. Because the majority of symptomatic patients encountered in the ED have atrial fibrillation of less than 48 hours' duration and the risk of stroke and other complications in such patients is low,⁹⁻¹¹ current practice remains cardioversion (electrical or medical) as soon as possible. In older patients with sustained atrial fibrillation, referral for cardioversion may be warranted for quality of life considerations; however, stroke prevention must be an integral component of pre- and postcardioversion management to reduce the risk of embolic stroke.

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EBEM TEACHING POINT

The Use of Observational Studies to Examine Adverse Effects

The observational study design is one in which individuals are observed or certain outcomes are measured without an experimental design. These may be prospective or retrospective registries of patients, observational cohort studies, before-after studies, interrupted time series, or other forms of lower-quality evidence. Some believe these designs are more representative of clinical practice (generalizability). Specifically, there is usually a higher representation of women, minorities, and the elderly in observational cohorts compared with randomized controlled trials.¹²

Because randomized controlled trials are usually small and long-term adverse effects are not routinely collected, observational studies may be required to detect rare or late adverse effects of treatments. Despite this potential, observational studies can be biased and confounded, yielding larger effect size estimates than randomized controlled trials. Therefore, a meta-analysis of poor-quality observational studies would only magnify this bias.

The Strengthening the Reporting of Observational Studies in Epidemiology guidelines¹³ (similar to CONSORT for clinical trials) have been published in an attempt to provide guidance as to how observational cohort studies should be presented, with the hope that high-quality observational studies will contribute to meta-analyses of adverse or rare adverse effects of interventions.

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