Resident Journal Review

Resident Journal Review: Management Strategies for Acute Atrial Fibrillation in the Emergency Department

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A more detailed review of the articles can be found online at Medscape.com.

Introduction

Atrial fibrillation (AF) and atrial flutter (AFL) are the most commonly occurring arrhythmias in the United States. Management strategies for AF and AFL emphasize ventricular rate control, cardioversion to normal sinus rhythm, and long-term interventions such as anticoagulation to reduce the risk of stroke. In patients for whom cardioversion is an option, either pharmacological or electrical cardioversion may be considered. While there is a significant amount of literature comparing the effectiveness and safety of pharmacologic versus electrical cardioversion in acute AF, studies which analyze discharge rates and hospital length of stay are becoming more frequent due to concerns over rising health care costs and emergency department (ED) overcrowding. This review focuses on treatment strategies for patients presenting to the ED with acute atrial fibrillation; in particular, rate control versus cardioversion, options for cardioversion (chemical versus electrical), and the safety of these strategies when used in the ED.


This review includes five observational studies totaling 1,593 ED patients with atrial fibrillation, treated by either rate control or cardioversion. The authors sought to determine whether treatment of patients presenting to the ED with recent-onset (less than 48 hours) AF or AFL with direct-current cardioversion (DCC), followed by discharge home, is safe and effective. Potential benefits of this approach include decreased length of stay, decreased cost, and improved patient satisfaction.

Success rates ranged from 85.5% to 97%, with only one (0.06%) thromboembolic complication reported. The one observed stroke occurred within 48 hours of visiting the hospital, in a patient who was not on anticoagulation post DCC.

Unfortunately, none of the studies compared complication rates to a control group of patients treated with alternative strategies. Furthermore, patient satisfaction rates with DCC were not adequately assessed or compared to alternative treatment regimens. Only one article addressed the potential cost benefit of rapid cardioversion, and found no significant cost difference.

Based on this review, DCC should be offered as a safe and effective treatment for patients presenting with new-onset AF or AFL, with success rates ranging from 85.5-97% and the risk of thromboembolic phenomena being as low as 0.06%.


This is a prospective cohort, multicenter study of 206 patients with AF or AFL presenting to the emergency department within 48 hours of symptom onset. Of note, this study is one of the included trials in the review by Cohn et al., discussed above. Cardioversion, whether chemical or electrical, was attempted in 115 patients (56.3%) and was successful in 110 (95.7%). Of these, chemical cardioversion was attempted in 52 patients and was successful in 31 (60%). DCC with procedural sedation was attempted in 83 patients and was successful in 80 (96%).

Of the 206 patients enrolled in the study, 183 (88.8%) were discharged from the ED. Six adverse events in the ED were recorded that required intervention: vomiting, hypotension, ventricular tachycardia, and hypotension. Only four of these events led to admission for observation and no patient died or developed a more severe dysrhythmia. At 45 days after the initial visit, no patient had died and thromboembolic events had occurred in two patients, both of whom developed expressive aphasia within 48 hours of their ED visit. Neither patient was receiving anticoagulation at the time of their thromboembolic event.

Based on their results, the authors conclude that DCC for AF or AFL is highly successful and carries a low risk for adverse events.


This review includes 14 studies with a total of 2,765 patients who presented to the ED with acute AF. It includes the study by Vincon et al., which is discussed individually above. Measured outcomes include hospital length of stay, discharge rates, effectiveness of DCC versus pharmacological cardioversion, readmission rates, and recurrence rates.

In four articles (Cristoni et al., Bellone et al., Vincon et al., and Dankner et al.), DCC was compared with pharmacologic cardioversion or with a conservative option, and in all four articles DCC was found to have superior efficacy for conversion to NSR. In the study by Cristoni et al., DCC was compared to pharmacologic cardioversion with amiodarone or class IC antiarrhythmics. Restoration of NSR occurred in 93% of patients in the DCC group versus 51% of those in the pharmacologic cardioversion group (P< 0.001). In the study by Bellone et al., in which DCC was compared with intravenous propafenone, 89.3% of patients treated with DCC had conversion to NSR compared with 73.8% of patients treated with propafenone (P= 0.02). The third study, by Vincon et al., is discussed separately above. The fourth and final trial by Dankner

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et al., is a retrospective study comparing DCC, chemical cardioversion (with propafenone, procainamide, or amiodarone), and rate control (with digoxin, verapamil, or beta-blockers) combined with observation for spontaneous conversion. The DCC group again had the highest rate of restoration of NSR at 78.2% (P < 0.001).

DCC was also found to be associated with higher discharge rates and shorter lengths of stay. Based on their results, the authors conclude that amiodarone is inferior to both class IC antiarrhythmics and ibutilide for chemical cardioversion. Furthermore, in patients with AF sustained for longer than 48 hours, combined DCC and chemical cardioversion was highly successful for conversion to NSR.

In the 13 trials that reported adverse events or complications, there were five early embolic events (0.1% of all patients from all trials), two of which occurred in patients who were cardioverted (one after DCC and one after chemical cardioversion), with the other three in patients being rate-controlled. This suggests that the embolic events may not have been associated with cardioversion itself. Serious adverse events such as hypotension and arrhythmias were infrequent, and no deaths were reported.


The Ottawa Aggressive Protocol for cardioversion of patients with AF or AFL in the ED includes eight clinical steps: assessment, rate control, pharmacologic cardioversion, electrical cardioversion, anticoagulation, disposition, plans for patients not treated with cardioversion, and recommended additions to the protocol. The study enrolled 660 ED patients with the primary diagnosis of new-onset atrial fibrillation or atrial flutter, and applied the Ottawa Aggressive Protocol. Pharmacologic cardioversion is first attempted with procainamide, then electrical cardioversion is attempted if pharmacologic intervention was not successful. Patients who undergo successful cardioversion are discharged home within one hour without additional medications.

There were 1,057 ED visits for AF or AFL. Six hundred sixty subjects had the aggressive protocol applied. Of the included patients, 39.6% received rate-controlling medications, 100% received IV procainamide, and 36.8% received subsequent electrical cardioversion. The conversion rates for AF and AFL with procainamide were 59.9% and 28.1%, respectively. The conversion rates for atrial fibrillation and atrial flutter for electrical cardioversion were 91% and 100%, respectively. The rate of

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Successful cardioversion with intravenous ibutilide was achieved in 75% of patients, and only five patients (6%) required a second dose of ibutilide. Sixty-eight (84%) patients were taking at least one other medication with the potential for QT prolongation. Although patients who were concomitantly taking amiodarone (47% of study population) were found to have a significant change (mean of 37 milliseconds) in QT interval after ibutilide administration, no adverse cardiovascular events occurred.

The authors conclude that ibutilide is a safe and effective agent for pharmacologic cardioversion of patients with AF and AFL. The two major limitations of this study are its retrospective design and small sample size. The latter raises doubt that the results are sufficiently powered to support the authors’ conclusions. In addition, there was no follow-up to assess maintenance of NSR beyond 24 hours.


In this study researchers reviewed medical records from 1,068 ED patients with AF or AFL of recent onset, to see which variables were associated with successful conversion to sinus rhythm. Six hundred thirty-four patients underwent cardioversion (428 electrical, 354 chemical, and 148 both).

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The researchers calculated that rate and rhythm controlling medications were associated with a reduction in the success rate of subsequent attempts at electrical cardioversion (OR 0.39 [95% CI 0.21-0.74] and 0.28 [95% CI 0.15-0.53] respectively, with both p values <0.001). However, the use of procainamide was associated with an increased success rate for chemical cardioversion (OR 2.32 [95% CI 1.43-3.74] with p value of 0.0002). Notably, only 37% of the chemical group converted, requiring 32.8% of patients in the chemical group to undergo electrical cardioversion.

Based on their results, Biecher et al., recommend not attempting to slow the ventricular response prior to cardioversion in patients presenting with acute AF or AFL. This study is limited by its design as an observational, non-randomized trial.

Conclusion

Atrial fibrillation and atrial flutter are encountered commonly by emergency physicians. While the management of unstable AF or AFL is unambiguous, there are several potential treatment modalities for stable but symptomatic AF or AFL.

Direct current cardioversion appears to be more effective than chemical cardioversion and carries a low risk for adverse effects. Ideally, ventricular rate control should not be attempted prior to cardioversion, as this may be associated with a decreased rate of successful conversion to NSR.

Chemical cardioversion’s advantage over DCC is that it does not require procedural sedation. If this is chosen over DCC, procainamide, ibutilide, or a class IC antiarrhythmic should be used. If chemical cardioversion is unsuccessful, DCC should be considered if there are no contraindications.

Additional References:


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