

Seven Years Experience of a Nurse-Led Elective Cardioversion Service in a Tertiary Referral Centre: An Observational Study



Peter T. Moore, MBBS, Gerald C. Kaye, MD, FRACP*,
Melissa Hamilton, NP, Leanne Slater, RN,
Paul A. Gould, PhD, MBBS, FRACP, John N. Hill, MBBS, FRACP

Department of Cardiology, Princess Alexandra Hospital, Ipswich Rd, Woolloongabba, Brisbane, Queensland, Australia 4102

Received 3 January 2014; accepted 24 January 2014; online published-ahead-of-print 6 February 2014

Background	Traditionally the provision of elective external direct current cardioversion (EDCCV) for patients with atrial arrhythmias has been doctor-led. Increasing demands on hospital beds and time pressures for doctors has driven the desire for an alternative approach. We established a nurse-led cardioversion service in 2006 and present our experience.
Methods	A prospective database of patients undergoing elective EDCCV between July 2006 and July 2013 was collected. Demographic data, arrhythmia, success and immediate complications of cardioversion were recorded.
Results	A total of 974 EDCCV were performed on 772 patients. The mean patient age was 62.7 years, 564 (73.1%) were male. In 530 patients (69.0%) AF was the primary arrhythmia, in 242 (31.0%) atrial flutter. All EDCCVs were performed in a high dependency unit. Sinus rhythm was obtained in 692 patients (89.6%). Of 640 outpatients, 629 (98.3%) were discharged on the same day of their procedure. Eleven patients (1.7%) required admission to hospital. No patients required urgent temporary transvenous or permanent pacing, and there were no deaths in association with this procedure.
Conclusions	Nurse-led elective EDCCV is a safe and effective way of restoring sinus rhythm in patients with AF or atrial flutter, with additional benefits to resource provision.
Keywords	Atrial fibrillation • Atrial flutter • External DC cardioversion • Nurse-led • Tachyarrhythmias

Introduction

Atrial fibrillation (AF) is the most commonly encountered cardiac arrhythmia, affecting up to 2% of the general population in the developed world [1]. It is associated with significant morbidity including cardiac failure and cerebrovascular accidents.

The issue of rhythm versus rate control in the treatment of AF remains contentious. A rhythm control strategy is

indicated in patients with a greater symptom burden. International guidelines support external direct current cardioversion (EDCCV) as a class I recommendation for emergent conversion in unstable AF due to a rapid ventricular rate, and a class IIa recommendation for an elective rhythm control strategy. Repeated procedures can be used in patients with symptomatic recurrence of AF refractory to other therapies (class IIb) [2].

The efficacy of EDCCV is superior to that of pharmacological attempts to obtain sinus rhythm and is a reliable, safe

*Corresponding author at: Department of Cardiology, Princess Alexandra Hospital, 199 Ipswich Rd, Wollongabba Q 4102. Tel.: +07 3176 2383; fax: +07 3176 7630, Email: gerald.kaye@health.qld.gov.au

procedure with few major complications [3,4]. Traditionally the provision of EDCCV has been hospital based and doctor-led, but increasing demands on hospital beds and pressures of time on junior doctors has driven alternative approaches. Previous publications have shown that an elective EDCCV service can be safely performed by trained nurses, potentially allowing greater throughput of patients without compromising safety [5,6].

We established a nurse led day case EDCCV service in 2006 and present our results and outcomes between 2006 and 2013. We believe this is the largest series presented, and the first published series from Australia.

Methods

Data was collected prospectively and entered into a database for all patients undergoing EDCCV within the Department of Cardiology at the Princess Alexandra Hospital (PAH), Brisbane, Queensland, Australia. These patients were elective outpatients, or inpatients undergoing EDCCV during an unplanned admission. The following parameters were measured: age, sex, presenting rhythm, outpatient or inpatient status, achievement of sinus rhythm, number of shocks undertaken and total energy delivered, left atrial diameter, left ventricular ejection fraction, and immediate complications. All procedures were performed by a trained electrophysiology nurse specialist with up-to-date advanced life support training.

Patients were selected for EDCCV at the discretion of their treating cardiologist. The nurse specialist undertook the following protocol. Patients were allocated to pre-designated EDCCV lists after undertaking a clinical review of each patient either in person (as an inpatient or in a preadmission clinic), or by telephone. The nurse specialist then ensured compliance with adequate anticoagulation in accordance with the prevailing guidelines, which mandated international normalised ratios (INR) >2.0 over at least three continuous weeks prior to EDCCV [7]. Medications were reviewed; digoxin was routinely withheld for three days, and beta-blockers for one day, prior to the procedure. All other anti-arrhythmic medications were continued unless otherwise specified by the treating cardiologist. A pre-EDCCV echocardiogram was not mandated, however echocardiographic measurements of left atrial area in the apical 4-chamber view, and left ventricular ejection fraction (LVEF) estimated by either visual estimation or Simpson's biplane method, were recorded if available.

On the day of the procedure the nurse specialist ensured that formal written consent was obtained prior to the patient's procedure by junior medical staff undertaking their rotation in the electrophysiology unit of the PAH Cardiology department. On the day of planned cardioversion each patient was reviewed with regard to their rhythm (confirmed with ECG or pacemaker interrogation), anticoagulation status, medical history and medications. Since the emergence of novel oral anticoagulants patients were required to confirm their constant compliance with dosing over the three weeks

preceding EDCCV. Patients with suboptimal anticoagulation, intercurrent illness, or rhythm not amenable to EDCCV were cancelled if required. The nurse specialist also coordinated anaesthetic assessment, undertaken by a trained anaesthetist on the day of the procedure.

EDCCV was performed in the post-anaesthetic care unit or cardiac catheter laboratory of the PAH. This involved a brief anaesthesia administered by an anaesthetist. Cardioversion was performed using adhesive electrode pads (Philips Heartstart XL) oriented anteroposteriorly to deliver rectilinear biphasic R-wave synchronised direct current defibrillation (Philips Heartstart XL). Energy levels used were in accordance with the joint guidelines of the American Heart Association (AHA), American College of Cardiology (ACC), and the European Society of Cardiology (ESC) [7]. Between 2006 and 2009 a regime of progressive biphasic shock energies of 100, 150 and 200 joules (J) was used for AF; and 50, 100, and 200J was used for atrial flutter. After 2009 all shocks were 200J, reflecting a change in department protocol. Continuous electrocardiogram (ECG) monitoring was used throughout with the decision for repeat EDCCV based on single lead rhythm strip analysis. A maximum of three shocks were attempted, unless otherwise advised by the specialist nurse or treating cardiologist.

In those patients with a cardiac implanted electronic device (pacemaker or implanted cardioverter defibrillator (ICD)), a consultant electrophysiologist attended the EDCCV procedure. On occasion, patients with ICD underwent commanded cardioversion internally via the device, at the discretion of the electrophysiologist. Those patients were excluded from further analysis in the current study.

Successful EDCCV was defined as persistence of sinus rhythm over at least 30 minutes of continuous cardiac monitoring following delivery of the successful shock. Thereafter patients were transferred to the post-surgical unit for a further 90 minutes of observation without ECG monitoring. The patient was discharged two hours post-EDCCV. The nurse specialist was the first point of call for any issues during this period. Changes to medication on discharge, or concerns with the safety of discharge, were raised with a member of the treating cardiology team.

Statistical Analysis

Discrete variables are expressed as frequency counts and percentages while continuous variables are expressed as means and standard deviations. Standard descriptive statistics are used when summarising group characteristics. Student's t-test and chi-square test were used to determine differences between patient variables and success of EDCCV. A probability value of <0.05 was considered significant.

Results

A total of 974 elective cardioversions were performed on 772 patients from July 2006 to July 2013. Six hundred and forty-two (82.9%) of these patients were outpatients. The mean patient age was 62.7 years, and 564 (73.1%) were male. Five

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