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Low cardiovascular event rate and high atrial fibrillation recurrence rate one year after electrical cardioversion

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ABSTRACT

Background: Electrical cardioversion is widely used to restore sinus rhythm in patients with atrial fibrillation. However, the long term clinical event and sinus rhythm maintenance rates following electrical cardioversion still remains unclear. This study evaluated one year incidence and risk factors for cardiovascular events and atrial fibrillation recurrence in a single center clinical practice.

Methods: In a prospective study 188 patients with atrial fibrillation who underwent electrical cardioversion were enrolled. Patients and their primary care physicians were followed up one year after cardioversion and patient clinical and arrhythmic event rate was evaluated. Data obtained from patients and general practitioners were combined and the results were analyzed with PSpP 0.8.5 software.

Results: Electrical cardioversion success rate was 90.4%. Within a year after cardioversion one patient (0.6%) suffered myocardial infarction, three patients (1.9%) had a stroke/transitory ischemic attack (TIA), three patients (1.6%) died and three patients (1.9%) had a bleeding event that required hospitalization. The presence of diabetes mellitus was the only factor with a tendency to increase the risk of combined event of myocardial infarction, stroke/TIA and bleeding ($P = 0.096$). At follow up 30.0% of patients reported having atrial fibrillation and within a year 62.2% had suffered at least one atrial fibrillation paroxysm. The proportion of patients who underwent additional cardioversions after the initial hospitalization was 32.5%. The factors that significantly increased the risk of atrial fibrillation recurrence were history of stroke/TIA ($P = 0.014$) and increased left atrial volume index on echocardiography ($P = 0.039$). Greater left atrial diameter had a tendency toward an increased risk ($P = 0.087$).

Conclusions: Cardiovascular event rate one year after electrical cardioversion was low. Electrical cardioversion had a high immediate success rate, however, maintenance of stable sinus rhythm in the long term was low.

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Introduction

Atrial fibrillation is the most frequently observed cardiac rhythm disorder with a prevalence of approximately 2% in the population [1]. Studies have shown that the incidence and prevalence of atrial fibrillation tends to increase over time [2,3] due to increasing average life expectancy and improved diagnosis and treatment of atrial fibrillation [4].

Atrial fibrillation is a risk factor for thromboembolic complications and it has been estimated that it may increase the risk of suffering from a stroke even fivefold [5]. In addition, the severity of strokes caused by atrial fibrillation is greater compared to ischemic cerebrovascular events in patients with carotid artery disease [6] due to the embolization of larger particles in patients with atrial fibrillation [6,7]. Patients suffering from atrial fibrillation have higher cardiovascular and non-cardiovascular mortality rate and atrial fibrillation can cause or worsen the course of congestive heart failure [8–10].

Electrical cardioversion is widely used to restore sinus rhythm in patients with atrial fibrillation. However, even after the restoration of sinus rhythm these patients are on a higher risk of suffering from thromboembolic complications. Therefore oral anticoagulation therapy is the mainstay of treatment in patients with a high risk of stroke [1]. This study was initiated to evaluate one year incidence and risk factors for cardiovascular events and atrial fibrillation recurrence in patients who underwent electrical cardioversion in a single center clinical practice.

Methods

Study participants

This prospective study was conducted from October 2015 to April 2016 in a single center University Hospital. A total of 188 consecutive patients who underwent synchronized direct-current cardioversion were enrolled. Patients were referred to the cardioversion unit after confirmation of atrial fibrillation by electrocardiographic recording by their primary care physician or from the emergency department. The study was approved by an institutional review committee. All patients gave an informed consent. The inclusion criteria were: age ≥ 18 years, confirmed atrial fibrillation on a 12-lead electrocardiogram, planned or performed sinus rhythm restoration by synchronized direct-current cardioversion at the index hospitalization. Patients with the anticipated life expectancy of less than one year, with contraindications for undergoing electrical cardioversion and patients with spontaneous or sinus rhythm restoration after pharmacological therapy were excluded from the study. During the index hospitalization patient demographic, echocardiographic, electrocardiographic and clinical laboratory data were collected.

Before electric cardioversion 12-lead electrocardiography was recorded and the diagnosis of atrial fibrillation was confirmed according to the standard criteria. Synchronized direct current cardioversion was performed according to the guidelines and was defined as successful if stable sinus rhythm was obtained and patient was discharged with sinus

rhythm. Patients with a definite duration of atrial fibrillation < 48 h underwent acute restoration of sinus rhythm by synchronized direct-current cardioversion without performing transoesophageal echocardiography before the procedure. In patients with atrial fibrillation lasting ≥ 48 h electrical cardioversion was performed after anticoagulation therapy pretreatment according to the ESC guidelines for the management of atrial fibrillation [1] or after the exclusion of atrial thrombus by transoesophageal echocardiography. At the discharge patients were prescribed anticoagulant therapy and long-term anticoagulation was prescribed in patients at high risk for stroke as recommended in the guidelines [1].

Clinical event assessment

One year after cardioversion patients were followed up by telephone calls. A national health registry was used to obtain enrolled patients' general practitioner email address and a patient follow-up questionnaire was sent. The main clinical events that were evaluated in the phone conversation with patient and in general practitioner's questionnaire were: suffering from a stroke, transitory ischemic attack (TIA), myocardial infarction, significant bleeding that required hospitalization, atrial fibrillation recurrence and repeat cardioversions within a year after the initial cardioversion. Additional information collected from the patient was: demographic parameters and current pharmacotherapy. All cause mortality was evaluated from the information obtained from general practitioners and by the use of a national health registry. Information obtained from the questionnaires filled by general practitioners were combined with data obtained from patients and used in data analysis. A total of 28 patients were excluded from the final data analysis due to failure in obtaining follow up information. A national registry confirmed death in three of these patients.

Statistical analysis was performed using PSPP 0.8.5 software. Continuous variables were expressed as mean \pm standard deviation (SD) and were analyzed with independent t-test. Categorical variables were expressed as percentages and frequencies. Fisher's exact test was used to assess the differences between groups with categorical variables. Results with $P < 0.05$ were considered statistically significant. Univariate logistic regression analysis was performed to examine the predictors associated with one year risk of atrial fibrillation recurrence and the combined event of myocardial infarction, stroke/TIA, significant bleeding and all cause death.

Results

Patient population

Patient baseline characteristics are shown in Table 1. Mean patient age was 65.4 years. Majority of the patients (57.7%) had a history of at least one cardioversion and 81.4% were on a high risk of stroke with ≥ 2 points in CHA2DS2-VASc score (congestive heart failure or left ventricular dysfunction, hypertension, age ≥ 75 (doubled), diabetes, prior ischemic stroke, TIA or thromboembolism (doubled), vascular disease, age 65–74, gender (female)).

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