OPEN ACCESS

Saudi Journal of Medicine

Abbreviated Key Title: Saudi J Med
ISSN 2518-3389 (Print) | ISSN 2518-3397 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article

Non-Valvular Atrial Fibrillation Cardioversion: Experience of the Cardiology department of Mohammed V Military Teaching Hospital

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DOI: 10.36348/sjm.2022.v07i05.006 | **Received:** 12.04.2022 | **Accepted:** 16.05.2022 | **Published:** 20.05.2022

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Abstract

Introduction: Atrial fibrillation represents a real public health problem. His ideal management in addition to the anticoagulation therapy would be the removal of this arrhythmia and any future recurrence, a goal often difficult to achieve.The aim of this work is to evaluate the efficacy of atrial fibrillation cardioversion as well as the success predictive factors of sinus rhythm maintenance at one year following a successful cardioversion. ***Materials and methods:*** 50 patients with non-valvular atrial fibrillation underwent cardioversion: 70% by electrical shock and 30% by pharmacological means, the clinical characteristics of the patients the results of cardioversion and follow-up were collected and analyzed. ***Results:*** The average age of our patients was 53 years with a sex ratio of 2. 30% of patients had hypertensive heart disease, 8% ischemic heart disease, 8% dilated cardiomyopathy and the rest had no underlying heart disease. The average diameter of the left atrium was 41 mm and the average surface area was 20 cm². Primary success rate of cardioversion was 82% with better efficacy of electric shock compared to pharmacological cardioversion. The maintenance rate of sinus rhythm at 1 year was 70%. Predictive factors of failure and / or recurrence at 1 year were old atrial fibrillation and significant dilation of the left atrium. ***Conclusion:*** This study confirms the interest of atrial fibrillation cardioversion and underlines the importance of preliminary selection of the patients, such a selection must be made on the basis of the predictive factors of success usually recognized in the literature.

Keywords: Electrical cardioversion; Pharmacological cardioversion; Non-valvular atrial fibrillation.

INTRODUCTION

Atrial fibrillation is the most frequent cardiac arrhythmia in the world its incidence is increasing due to the population aging its management in its rhythmic aspect is based on the choice between two strategies: a rate control strategy, meaning acceptance of the arrhythmia and attempting to slow its conduction to the ventricles, or a rhythm control strategy aiming to supress the arrhythmia and restore a sinus rhythm.

The objective of this work is to evaluate the effectiveness of atrial fibrillation cardioversion by external electric shock or by pharmacological means, to compare these two modes of cardioversion and to identify the factors associated with primary failure of AF cardioversion or its early recurrence.

MATERIALS AND METHODS

This is a prospective inclusion study, conducted in the Cardiology Department of the Mohammed V Military Training Hospital. 50 patients were admitted for cardioversion of atrial fibrillation of non-valvular origin. An electrocardiogram and a transthoracic echocardiography were performed in all our patients completed in certain cases by a transoesophageal echocardiography. The left ventricular function assessed by the ejection fraction (LVEF) and the size of the left atrium evaluated by the diameter and the surface area were the main parameters of interest in the echocardiographic assessment, some blood testing was also carried out including a renal function and a thyroid assessment. Cardioversion was performed by biphasic synchronous external electric shock or by pharmacological treatments. Patients in whom sinus rhythm was restored were followed for 12 months with

an ECG at 1 month, 6 months and 1 year. The main clinical characteristics of the patients, Para-clinical findings and patient follow-up results were collected and analysed.

RESULTS

The average age of our patients was 53 years old with a sex ratio M/F of 2. The median evolution of AF was 12 months [4-24] with extremes ranging from 3 months to Four years. 30% of our patients presented with hypertensive heart disease, 8% with ischemic heart disease and 8% with non-ischemic dilated cardiomyopathy, while 54% had atrial fibrillation without underlying heart disease. More than 90% of our patients were symptomatic despite medical treatment, 77% of whom had severe symptoms (EHRA score III or VI). The average diameter of the left atrium was 41 mm and the surface area was 20 cm², the average systolic function evaluated by the left ventricular ejection fraction was 57%. The mean CHA2DS2-VASC score was 1,5. The clinical characteristics, the echocardiographic and therapeutic data of these patients are summarized in Table 1.

Most of our patients underwent electrical cardioversion (70% of patients), the remaining 30% underwent drug cardioversion mainly by intravenous flecainide or amiodarone. The overall primary success rate was 82% with a difference in efficacy in favour of the electrical cardioversion: 88% versus the pharmacological cardioversion: 74% of success rate. The rate of maintenance in sinus rhythm at one year of follow-up was 70%.

The predictive criteria for primary failure and/or recurrence at one year were long-standing atrial fibrillation and a significant dilation of the left atrium. (Table 2)

Table 1: Clinical characteristics and echocardiographic findings of the patients

Average age (years)	**53(+/- 3)**
Sex-ratio M/F	2
Echocardiographic data * left atrial diameter (mm) * left atrial surface area (cm2) * LVEF (%)	 41 (+/- 5) 20cm² (+/- 4) 57 (+/- 8)
Aetiologies * Hypertensive cardiomyopathy * ischemic cardiomyopathy * dilated cardiomyopathy * no underlying heart disease	 30% 8% 8% 54%
Symptoms severity EHRA I	 8%
EHRA II	15%
EHRA III	50%
EHRA IV	27%

Table 2: Factors associated with the success of atrial fibrillation cardioversion

	Sinus rhythm at 1 year	**Primary failure or recurrence at 1 year**	**p**
Age (years)	52+ /- 10	54+/- 9	0.6
left atrial diameter (mm))	39	45	**0.04**
left atrial surface area (cm2)	19	23	**0.03**
LVEF (%)	58	55	0.4
Duration (months)	16	27	**0.04**
Heart disease (%)	41	48	0.9

DISCUSSION

AF management include two main aspects with different challenges: on one hand the thromboembolic aspect essentially based on the assessment of the risk of ischemic stroke or systemic embolism using the CHA2DS2 Vasc score to indicate anticoagulant treatment with a direct impact on mortality [1], On the other hand The rhythmic aspect aims to control patient symptoms with no real impact on survival, as evidenced by the latest CABANA [2] and AFFIRM [3] study. This last part uses two approaches: ablation, which has experienced considerable growth over the past two decades, and cardioversion, which remains a topical subject, at least in our local context where ablative techniques are still in their infancy.

Electrical cardioversion is more often performed than pharmacological cardioversion in our practice, it is recommended to perform it by a biphasic electric shock, superior to the monophasic shock [4, 5], synchronous to the QRS, preferably anteroposterior, reported to be of superior efficacy to the other locations [5, 6], starting with an energy of 100j. Patients often

require brief sedation and monitoring during and few hours after shock. Potential complications of electrical cardioversion include risk of embolism especially if the patient is not correctly anticoagulated, occurrence of ventricular fibrillation if the shock is delivered during the vulnerable phase of repolarisation (on the T wave), or in setting of hypokalaemia or digitalis overdose.

Pharmacological cardioversion uses different antiarrhythmic drugs depending on the underlying heart disease and local availability, it can be done with flecainide, propafenone in the absence of heart disease or conductive disorder otherwise amiodarone is preferred in the presence of heart disease, Vernakalnt and Ibutilide are indicated especially in recent AF [1]. In our context only flecainide and amiodarone are available.

All of these drugs can cause pro-arrhythmic effects: Torsade de pointes, polymorphic ventricular tachycardia, ventricular fibrillation, severe conductive disorders, Atrial flutter with rapid one to one conduction, therefore patients should be continuously monitored with readily available advanced life support measures.

Although randomized controlled trials have not shown superiority of rhythm control over heart rate control in terms of mortality [3], recently there has been a revival of interest in rhythm control approach as reported is some European registries: 67% of symptomatic patients and 44% of asymptomatic patients [7].

In our context, cardioversion remains underused, it is often proposed to symptomatic patients (EHRA 3 and 4) in spite of taking an antiarrhythmic medical treatment who do not have severe heart disease or significant dilation of the left atrium.

Restoration of sinus rhythm was achieved in 82% of our patients with a difference in the efficacy observed between the two modes of cardioversion: electrical (88%) and pharmacological (74%), the rate of maintenance of sinus rhythm at 1 year was 70%. The primary success rate reported in the literature varies between 70-90%, the maintenance of sinus rhythm at 1 year is about 60% [8].

Electrical cardioversion was used more than pharmacological cardioversion, the same trend is observed in an international registry [9], it was more effective than pharmacological cardioversion. This same observation has been reported in some European registers [10, 11].

No major complications occurred in our study. The predictive factors of recurrence of atrial fibrillation after successful cardioversion are: the duration of evolution of the arrhythmia before cardioversion, the number of previous recurrences, the size of the left atrium and the presence of underlying heart disease [12]. A post-reduction P wave duration > 135 msec was associated with a higher risk of recurrence in the follow-up of the AFFIRM study [13]. Among these factors those associated with cardioversion failure or early recurrence in our study were: the duration of AF and the size of the left atrium.

CONCLUSION

Rhythm control strategy of atrial fibrillation through cardioversion is still an interesting option among the therapeutic arsenal of this frequent arrhythmia, it must be performed at the early stages of the evolution in carefully selected patients to enhance the likelihood of its durable success.

REFERENCES

1. Kirchhof, P., Benussi, S., Kotecha, D., Ahlsson, A., Atar, D., & Casadei, B. (2016). ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. *European heart journal*, 37(38), 2893-962. PubMed PMID: 27567408. Epub 2016/08/28. eng.
2. Packer, D. L., Mark, D. B., Robb, R. A., Monahan, K. H., Bahnson, T. D., Moretz, K., ... & CABANA Investigators. (2018). Catheter ablation versus antiarrhythmic drug therapy for atrial fibrillation (CABANA) trial: study rationale and design. *American heart journal*, *199*, 192-199.
3. Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM) Investigators. (2002). A comparison of rate control and rhythm control in patients with atrial fibrillation. *New England Journal of Medicine*, *347*(23), 1825-1833.
4. Mittal, S., Ayati, S., Stein, K. M., Schwartzman, D., Cavlovich, D., Tchou, P. J., ... & Lerman, B. B. (2000). Transthoracic cardioversion of atrial fibrillation: comparison of rectilinear biphasic versus damped sine wave monophasic shocks. *Circulation*, *101*(11), 1282-1287.
5. Kirchhof, P., Mönnig, G., Wasmer, K., Heinecke, A., Breithardt, G., Eckardt, L., & Böcker, D. (2005). A trial of self-adhesive patch electrodes and hand-held paddle electrodes for external cardioversion of atrial fibrillation (MOBIPAPA). *European heart journal*, *26*(13), 1292-1297.
6. Alp, N. J., Rahman, S., Bell, J. A., & Shahi, M. (2000). Randomised comparison of antero-lateral versus antero-posterior paddle positions for DC cardioversion of persistent atrial fibrillation. *International journal of cardiology*, *75*(2-3), 211-216.
7. Nieuwlaat, R., Capucci, A., Camm, A. J., Olsson, S. B., Andresen, D., Davies, D. W., ... & Crijns, H. J. (2005). Atrial fibrillation management: a prospective survey in ESC member countries: the

Euro Heart Survey on Atrial Fibrillation. *European heart journal*, *26*(22), 2422-2434.

8. Camm, A. J., Kirchhof, P., Lip, G. Y., Schotten, U., Savelieva, I., & Ernst, S. (2010). Guidelines for the management of atrial fibrillation: the Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC). Europace : European pacing, arrhythmias, and cardiac electrophysiology: journal of the working groups on cardiac pacing, arrhythmias, and cardiac cellular electrophysiology of the European Society of Cardiology, 12(10), 1360-420. PubMed PMID: 20876603. Epub 2010/09/30. eng.
9. Crijns, H. J., Weijs, B., Fairley, A. M., Lewalter, T., Maggioni, A. P., Martín, A., ... & Le Heuzey, J. Y. (2014). Contemporary real life cardioversion of atrial fibrillation: Results from the multinational RHYTHM-AF study. *International journal of cardiology*, *172*(3), 588-594.
10. Kiliszek, M., Opolski, G., Włodarczyk, P., Dąbrowski, R., & Ponikowski, P. (2014). Cardioversion of atrial fibrillation (RHYTHM-AF) international registry in Poland. *Cardiology Journal*, *21*(5), 484-491.
11. Gitt, A. K., Smolka, W., Michailov, G., Bernhardt, A., Pittrow, D., & Lewalter, T. (2013). Types and outcomes of cardioversion in patients admitted to hospital for atrial fibrillation: results of the German RHYTHM-AF Study. *Clinical Research in Cardiology*, *102*(10), 713-723.
12. Abu-El-Haija, B., & Giudici, M. C. (2014). Predictors of long-term maintenance of normal sinus rhythm after successful electrical cardioversion. *Clinical cardiology*, *37*(6), 381-385.
13. Raitt, M. H., Volgman, A. S., Zoble, R. G., Charbonneau, L., Padder, F. A., O'Hara, G. E., ... & AFFIRM Investigators. (2006). Prediction of the recurrence of atrial fibrillation after cardioversion in the Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM) study. *American heart journal*, *151*(2), 390-396.