ACTA MEDICA TRANSILVANICA March;25(1):20-22
DOI: 10.2478/amtsb-2020-0006
Online ISSN 2285-7079

PRINCIPLES OF RHYTHM MANAGEMENT IN PATIENTS WITH ATRIAL FIBRILLATION

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Keywords: *atrial fibrillation, cardioversion, echocardiographic parameters*

Abstract: *Atrial fibrillation is a multilateral arrhythmia, which causes the clinician to encounter difficulties in its therapeutic approach for each new patient. The purpose of this paper aims in particular at evaluating the management of atrial fibrillation, namely its cardioversion and rhythm control. The population study consisted of 50 patients diagnosed with atrial fibrillation, who underwent transesophageal echocardiographic investigation before cardioversion. All of these patients had transesophageal echocardiography. Certain echocardiographic parameters, such as the size of the left atrium, the presence of intracavitary thrombi, the left atrial appendage flow velocity, and the presence of spontaneous contrast, were taken into account. Cardioversion (electrical and pharmacological) was successful in 78.05% of patients. An appendage flow velocity greater than 40 cm/s, the absence of spontaneous contrast and the normal size of the left atrium, can be among the predictors of successful cardioversion.*

INTRODUCTION

Atrial fibrillation is one of the most sustained arrhythmias encountered in medical practice. It is represented by a disorganized, rapid and irregular atrial activation, followed by an irregular ventricular response. This is a multilateral arrhythmia, which causes the clinician to encounter difficulties in its therapeutic approach for each new patient.(1,2,3) The most effective method of monitoring from a paraclinical point of view is echocardiography, especially the transesophageal one, which is capable of carrying information regarding the presence of intracavitary thrombi, as well as the presence of the other echocardiographic parameters, respectively the size of the left atrium, the left atrial appendage flow velocity and the spontaneous echocardiographic contrast.(4,5,6) The most effective treatment method is the conversion of atrial fibrillation to normal sinus rhythm, which can be done pharmacologically, but also electrically. Another main aspect is the prophylaxis of systemic embolism.(7,8)

AIM

The purpose of this paper is aimed in particular at evaluating the management of atrial fibrillation, namely its restoration and rhythm control, highlighting whether there is an association between certain echocardiographic aspects and the prognosis of cardioversion.

MATERIALS AND METHODS

Study population

This paper represents a retrospective observational analytical study, performed on a batch of 50 patients diagnosed with atrial fibrillation, having a complete medical history and a rigorous objective examination and who have undergone transesophageal echocardiographic investigation before pharmacological or electrical cardioversion. All patients were therapeutically anticoagulated with low molecular weight heparin prior to echocardiographic investigation and cardioversion. Using transesophageal echocardiography, stratification was performed from the point of view of the presence of intracavitary thrombi, so that in their absence, patients underwent cardioversion immediately followed by oral anticoagulation therapy for a minimum of 4 weeks. If thrombi were present, cardioversion was postponed. All patients were admitted to the Cardiology Department of the Sibiu County Emergency Clinical Hospital during the period 01.01.2015-28.12.2018, the institution offering the consent for the respective study, obtaining the informed consent of the patients. Therefore, the main objective was to determine the functional status and to restore and maintain the sinus rhythm in the patients included in the group. Considering that all these patients had transesophageal echocardiography, certain echocardiographic parameters were taken into account, such as the size of the left atrium, the presence of intracavitary thrombi, the left atrial appendage flow velocity and the presence of spontaneous contrast. Also, attention was paid to certain general characteristics such as age, gender, provenance, risk factors, type of atrial fibrillation and data on pharmacological medication.

The analyzed group consists of female and male patients aged between 42 and 80 years, from urban and rural areas. To carry out the study, several methods were used, namely the method of the bibliographic study, analyzing specialized materials and articles that included studies on atrial fibrillation, necessary for the present research. The case study

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Article received on 08.11.2019 and accepted for publication on 24.02.2020

was also used, following the data of the patients obtained from the database of the Sibiu Emergency Clinical Hospital.

Data analysis

Statistical analysis was performed using Microsoft Excel 2019, Kolmogorov-Smirnov, Anova, Bonferonni and Chi-squared tests. The Kolmogorov-Smirnov test was used for the normality of the distribution of velocity values and the size of the left atrium. Anova test was used for statistical analysis with statistically significant correlation if p=0.001, df=3 and F=6.8. Bonferroni and Chi-squared tests were preferred for multiple comparisons and Cross tabulation method was used to analyze the relationship between multiple variables.

RESULTS

Regarding the general data, most cases were reported in 2018 (18 cases). Of the 50 cases included in the batch, 54.00% were males and 46.00% were females. The urban environment was represented by 31 (62.00%) cases and the rural area by 19 (38.00%) cases. The most cases are found between the age groups 70-80 and 60-69. Persistent atrial fibrillation was the most common type of atrial fibrillation, representing a percentage of 80.00%. Predisposing clinical risk factors were present in all patients included in the group, each of them presenting at least one factor. The most common clinical risk factors are valvulopathies (76.00%), heart failure (72.00%) and high blood pressure (68.00%).

10 patients (20.00%) with presence of thrombi were automatically excluded from the cardioversion stage because of the increased risk of developing a thrombembolic accident. Thus, patients without thrombi, 40, underwent cardioversion, of whom 30 (75.00%) were converted to sinus rhythm. Of the 30 patients with sinus rhythm, 15 (50.00%) were electrically converted and 15 (50.00%) pharmacologically. Considering the 15 patients converted pharmacologically, 10 of them, respectively 66.67% were converted with amiodarone. After the conversion, 28 (93.33%) of the patients received as anticoagulant medication, acenocumarol.

Regarding the association of cardioversion with the essential echocardiographic parameters, it was found that a successful cardioversion was associated with a left atrial appendage flow velocity > 40 cm/sec in proportion of 76.67%, while cardioversion failure was associated with a velocity <40 cm/sec in proportion of 80.00%. In case of failure, the emptying rate is lower on average, compared to the electrical or pharmacological conversion, significant difference for df = 3, F = 6.8 and p = 0.001 (table no.1, figure no.1).

Table no. 1. Association of cardioversion with left atrial appendage flow velocity and size of the left atrium

		Sum of Squares	df	Mean Square	F	Sig.
Velocity	Between Groups	3855.180	3	1285.060	6.883	.001
	Within Groups	8588.100	46	186.698		
	Total	12443.280	49			
Left atrium size	Between Groups	821.820	3	273.940	3.224	.031
	Within Groups	3908.100	46	84.959		
	Total	4729.920	49			

Spontaneous contrast was found in 30.00% in the case of conversion failure, while patients with successful conversion had spontaneous contrast in proportion of 13.3%. The difference is statistically significant for df = 3 and p = 0.0001 (table no. 2).

Figure no. 1. Association of cardioversion with left atrial appendage flow velocity

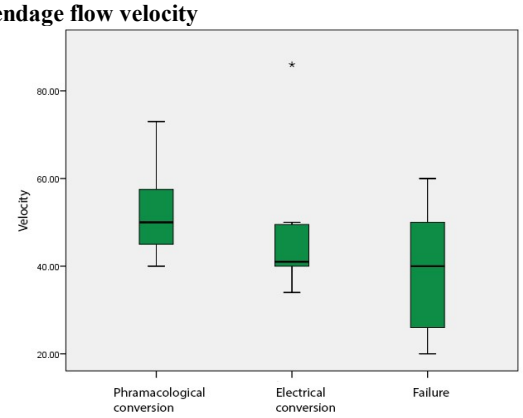

Table no. 2. Association of cardioversion with spontaneous contrast

		Spontaneous contrast		Total
		no	yes	
Conversion	Pharmacological	13	2	15
		86.7%	13.3%	100.0%
		39.4%	11.8%	30.0%
	Electrical	13	2	15
		86.7%	13.3%	100.0%
		39.4%	11.8%	30.0%
	Failure	7	3	10
		70.0%	30.0%	100.0%
		21.2%	17.6%	20.0%
Total		33	7	40
		66.0%	34.0%	100.0%
		100.0%	100.0%	100.0%

DISCUSSIONS

In this paper, attention was paid to patients with atrial fibrillation diagnosed and treated within the Cardiology Department of the Sibiu County Emergency Clinical Hospital. The study topic consisted of the evaluation of the principles of maintenance of the sinus rhythm in the patients with atrial fibrillation and considered the analysis of the patients from the point of view of the general data, of the paraclinical investigations and of the therapeutic management. 50 patients diagnosed with atrial fibrillation and transesophageal echocardiography were analyzed.

General data

Regarding the general data, the majority of the patients were males, living in the urban area and being in a 70-80 years age group. Regarding the risk factors predisposing to atrial fibrillation present in the patients included in the group, the most common ones are valvulopathies, heart failure and high blood pressure. The most common type of atrial fibrillation, present in a proportion of 80.00%, was persistent atrial fibrillation.

Cardioversion

Cardioversion was postponed in all 10 patients included in the group who had thrombi in the left appendage, evidenced by transesophageal echocardiography. Cardioversion was successful in 75.00% of patients and with failure in 25.00% of them. 15 patients had electric cardioversion, and 15 patients had pharmacological cardioversion. Pharmacological cardioversion was performed with antiarrhythmic medication, the most commonly used antiarrhythmic being amiodarone with a percentage of 66.67%, followed by propafenone and metoprolol. After cardioversion, it was necessary to introduce oral anticoagulation therapy for at least 4 weeks, the most commonly used drug being acenocumarole (93.33%).

Echocardiographic variables

The parameters of transesophageal echocardiography were analyzed in correlation with the success or failure of cardioversion at sinus rhythm. They have been found to be linked to a successful cardioversion. The left atrial appendage flow velocity and the spontaneous contrast had different proportions in what was the success or failure of the cardioversion. The left atrial appendage flow velocity was greater than 40 cm/s in patients with successfully cardioversion (76.67%), compared to those in whom cardioversion failed. The percentage of patients with spontaneous contrast was lower in those with a successful cardioversion (13.3%), compared to the others.

Therefore, two predictors for successful cardioversion were found, namely left atrial appendage flow velocity greater than 40 cm/s and the absence of spontaneous contrast.

CONCLUSIONS

The main objective of this study was to evaluate the principles of rhythm management in patients with atrial fibrillation. Successful management of atrial fibrillation requires meticulous evaluation, both clinically and paraclinically.

Echocardiography, especially the transesophageal one is a safe investigation and is at the centre of diagnosis and management, and with a correct approach, early cardioversion can be used. At the same time, this method of investigation provides essential information about cardiac function, complications and prognosis of patients with atrial fibrillation.

Increasing the presence of thrombi in the left appendage is a very important aspect in the cardioversion decision. Thus, if their presence is confirmed, cardioversion will be automatically delayed, the patient requiring mandatory anticoagulant therapy until the next cardioversion investigation.

Therefore, by analyzing some of the essential echocardiographic parameters before cardioversion, namely the velocity of the left appendage flow, the spontaneous contrast and the size of the left atrium, it was found that they can provide valuable information regarding the success of cardioversion. Therefore, a left atrial appendage flow velocity greater than 40 cm/s and the absence of spontaneous contrast may be among the predictors of successful cardioversion, while a left atrial appendage flow velocity less than 40 cm/s and the presence of spontaneous contrast may correlate with cardioversion failure.

In conclusion, the management of rhythm in patients with atrial fibrillation requires a complex and correct approach of the patient, both in terms of clinical and paraclinical status. The analysis of certain essential parameters, such as those offered by transesophageal echocardiography, may be associated with correct and long-term management of atrial fibrillation.

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