

THE ISSUE OF RESTITUTION AND MAINTENANCE OF SINUS RHYTHM IN ATRIAL FIBRILLATION

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Keywords: atrial fibrillation, sinus rhythm, electrical cardioversion, pharmacological conversion, left atrium, ejection fraction

Abstract: Atrial fibrillation is a heart disease which is an important public issue because of its association with morbidity and mortality rates at increasingly higher, here including long-term increase risk of stroke and heart failure. Independent of disease severity, atrial fibrillation is associated with impaired quality of life. Atrial fibrillation the most common and known cardiac arrhythmia in most countries of the world, posing a serious risk for transient ischemic attack. Predisposing factors for developing atrial fibrillation are the causes that lead to the appearance of heart failure, mitral regurgitation and last but not least hypertension. Some classes of antihypertensive agents may decrease the risk of arrhythmias. The mechanism by which these antihypertensive drugs reduce the likelihood of atrial fibrillation is unknown, although some studies suggest that these drugs interfere with the renin-angiotensin system through which influence cardiac remodeling, who is believed that she would influence the maintenance of sinus rhythm after convulsion or the reappearance of recurrent atrial fibrillation. The risk of embolic complication is six times higher in patients with atrial fibrillation compared with patients with sinus rhythm. Approximately 15-20% of stroke cases occur in people with atrial fibrillation. Despite the contradictions that exist in terms of effectiveness and adverse reactions that occur over time, antiarrhythmic therapy is generally used to prevent recurrence of atrial fibrillation. The likelihood of recurrence of the disease between 6 and 12 month is almost 50% with most medicines. An alternative to drug therapy has become lately catheter ablation who produces removing the source or trigger that cause atrial fibrillation. In recent years many studies have been the focus of studying the effectiveness of this type of treatment to existing treatments. While the incidence of atrial fibrillation continues to grow, it is important to identify treatments that are safe, effective for this type of disease and also to improve patient symptoms and its daily life. Recommended treatments for the management of this arrhythmia are primarily geared toward the safety of the patients. The choice of which strategy to follow in the treatment of atrial fibrillation is not without controversy.

Cuvinte cheie: fibrilația atrială, ritm sinusal, conversie electrică, conversie farmacologică, atriul stâng, fracție de ejecție

Rezumat: Fibrilația atrială este o boală cardiacă care reprezintă o problemă publică importantă datorită asocierii acesteia cu o morbiditate și o mortalitate aflate la cote din ce în ce mai ridicate, aici incluzând și creșterea pe termen lung a riscului de accident vascular cerebral și al insuficienței cardiace. Independent de severitatea bolii, fibrilația atrială este asociată cu afectarea calității vieții. Un studiu efectuat în Clinica de Cardiologie a Spitalului Clinic Județean de Urgență Sibiu a avut ca scop studierea evoluției fibrilației atriale după cardioversie și aprecierea eficacității de restabilire și menținere a ritmului sinusal prin două modalități de tratament: cardioversie electrică, cardioversie medicamentoasă. Prin acest studiu a fost determinată modalitatea mai eficientă de conversie a fibrilației atriale și menținere a ritmului sinusal între 2 moduri de restabilire a ritmului sinusal: electric și farmacologic. Astfel conversia electrică ar trebui avută în vedere ca și opțiune de primă intenție în tratarea fibrilației atriale. Restabilirea și menținerea ritmului sinusal în fibrilația atrială este influențată de bolile asociate, în special CIC, este de preferat să se efectueze o evaluare a raportului beneficiu/riscuri la acești pacienți înainte de conversia fibrilației atriale. Ca și tratament post conversie asocierea de Amiodaronă+Bisoprolol+ IEC este cea mai bună alegere. HTA și dislipidemia nu influențează semnificativ cardioversia și menținerea ritmului sinusal. Diametrul atriului stâng nu influențează conversia fibrilației atriale la ritm sinusal și nici menținerea acestui ritm. Pacienții cu FE<50% și volumul maxim al AS>40 ml trebuie urmăriți mai des, acești 2 parametrii (funcția de rezervă a atriului stâng) fiind un factor de predicție a recurențelor fibrilației atriale. Restabilirea contracției atriale înlătură staza intraarterială, micșorează incidența trombilor migratori, favorizează reducerea dimensiunilor atriilor. Prin urmare restabilirea și menținerea ritmului sinusal pare a fi opțiunea cea mai adecvată în fibrilația atrială

INTRODUCTION

Atrial fibrillation is a heart disease which is an important public issue because of its association with morbidity

and mortality rates at increasingly higher, here including long-term increase risk of stroke and heart failure. Independent of disease severity, atrial fibrillation is associated with impaired

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quality of life.

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While the incidence of atrial fibrillation continues to grow, it is important to identify treatments that are safe, effective for this type of disease and also to improve patient symptoms and its daily life. Recommended treatments for the management of this arrhythmia are primarily geared toward the safety of the patients. The choice of which strategy to follow in the treatment of atrial fibrillation is not without controversy.

Some researchers argue that keeping the rhythm is as important as maintaining the heart rate in the treatment of atrial fibrillation. The decision on the strategy to follow in treating this disease must take into account many individual factors, namely:

- patient age
- the presence of diseases which affect cardiac structure
- the effectiveness of medical products
- dose to be administered
- potential toxicity of the drug in the individual

Toxic effect of drugs is especially important in the case of antiarrhythmic drugs which increase the risk of torsades de pointes appearance. Other antiarrhythmic drugs are associated with serious effects on the thyroid and pulmonary toxicity. You must monitor closely the patients during treatment, and drugs interactions that may occur in the process and which could influence and even compromise the quality of life and functional status. Therefore we must find a treatment that allow us to maintain sinus rhythm much longer, but also to be associated with a safe profile and which improve clinical symptoms and reduce the risk of other complications of atrial fibrillation such as stroke and cardiovascular events and why not the period of hospitalization and also the costs that are required for the treatment.

Over the years there have been numerous studies from which it was discovered that in the case of atrial fibrillation occurs a number of structural and electrophysiological changes that could be decisive for the further evolution of the disease and life of the patient. So it is important to study the association between the maintenance of sinus rhythm and changes occurring

at the level of the heart during this disease, this arrhythmias having a negative effect on patients. Restoring sinus rhythm can be achieved by pharmacological conversion, electrical conversion and catheter ablation.

THE AIM OF THE STUDY

A study performed in Cardiology Clinic of Sibiu Emergency Hospital, aimed at studying the evolution of atrial fibrillation after conversion and assessing the effectiveness of restoring and maintaining sinus rhythm in two treatment modalities: electrical conversion and pharmacological conversion.

Exploration targets in this study were:

- assessment of the effectiveness of each treatment in part in restoring sinus rhythm in patients with atrial fibrillation
- assessment of the duration of sinus rhythm maintenance for each type of treatment
- assessing the effect of preventing recurrence of atrial fibrillation after conversion as a result of treatment
- studying the dynamics of myocardial contractile function of atrium after conversion

MATERIAL AND METHOD

This is an prospective study aimed at patients diagnosed with atrial fibrillation in the period 2009 – 2010 in the Cardiology Clinic of Sibiu Emergency Hospital, both men and women, regardless of age, with paroxysmal atrial fibrillation and persistent atrial fibrillation, in the presence of ischemic heart disease, hypertension and dilated cardiomyopathy, and having left atrium size less than 60 mm and duration of atrial fibrillation over 48 hours.

Inclusion criteria: Patients with paroxysmal atrial fibrillation or persistent atrial fibrillation in the presence of ischemic heart disease, hypertension or dilated cardiomyopathy and who have left atrium size less than 60 mm and duration of atrial fibrillation over 48 hours in the absence of cardiac valvulopathy.

Exclusion criteria:

- patients with left atrium size over 60 mm
- patients with thyroid dysfunction
- congenital heart diseases
- cardiac tumors
- patients with cardiac valvulopathy

Restoring sinus rhythm by electrical conversion was obtained by external electrical shock after two weeks of oral anticoagulation in the case of atrial fibrillation older than 48 hours, which will be continued after electrical conversion. The electrical conversion was performed by administering electrical shock of 100 – 200 J, maximum 3 consecutive shocks according to protocol.

For the pharmacological conversion we used Amiodarone, initially 450 mg in 500 ml glucose infusion (the average loading dose of 5 mg/kg body), then 300 mg Amiodarone in infusion if we don't get the conversion to sinus rhythm after the first conversion attempt from pharmacological conversion. After conversion it was administered Amiodarone 200mg/day and patients continued treatment with Amiodarone maintenance dose of 200 mg/day during the period they were followed (16 months \pm 2 months).

Patients who recovered sinus rhythm were divided into several groups:

- patients who have received post conversion Amiodarone 200 mg/day
- patients who have received post conversion Amiodarone 200mg/day + Bisoprolol 5 mg/day

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- patients who have received post conversion Amiodarone + Converting enzyme inhibitor
- patients who were treated post conversion with Amiodarone 200mg/day + Bisoprolol 5 mg/day + Converting enzyme inhibitor

Ultrasound assessment (done by performing 4 rooms cardiac ultrasound) of the influence of the atrial size value in maintaining sinus rhythm, it was performed by dividing patients into two groups according to size of left atrium. Thus they were divided in patients with:

- left atrial size ≤ 45 mm
- left atrial size > 45 mm

For the study of correlation between left ventricular systolic functional and duration of maintenance of sinus rhythm after conversion, the patients will be divided into two group according to the value of left ventricular ejection fraction assessed by ultrasound:

- patients with $EF \leq 50\%$
- patients with $EF > 50\%$

Patients were reviews by clinical and laboratory examinations (ECG, Ultrasound): 1months, 3 months, 6 months, 12 months.

RESULTS AND DISCUSSIONS

As in other carried out previously, in this study atrial fibrillation was more common in men than in women, its incidence increases with age and restoration of sinus rhythm improved clinical status of patients, it increases cardiac output and increased tolerance to the effort.

According to the results of this study, electrical conversion is more effective in restoring sinus rhythm in patients compared with pharmacological conversion to patients under 70 years in both type of paroxysmal atrial fibrillation and persistent atrial fibrillation, and in patients over 70 years, electrical conversion efficiency decreases, it becomes compared equal to the pharmacological conversion.

After electrical conversion, time maintaining sinus rhythm is higher compared to pharmacological conversion and recurrence rate was influenced by associated diseases, it is higher in patients who have associated with ischemic heart disease, compared with those that associated had hypertension or dyslipidemia.

Relapse rate and the length of maintenance of sinus rhythm is influenced by medication taken after conversion, the combination of Amiodarone 200mg/day + Bisoprolol 5 mg/day + Converting enzyme inhibitor being more effective in maintaining sinus rhythm and to prevent recurrence than taking Amiodarone alone, or Amiodarone + Converting enzyme inhibitor, or Amiodarone 200mg/day + Bisoprolol 5 mg/day in both type of conversion, pharmacological or electrical conversion.

In the ultrasound study was investigated the effect that left atrial size has on atrial fibrillation and the effect that left atrial reservoir function (the correlation between the size of left atrium and the left atrial ejection fraction) has on conversion of atrial fibrillation and on the maintenance of sinus rhythm after conversion. Thus it was found that left atrial size does not influence the conversion rate to sinus rhythm, but the maximum volume of left atrium $> 40\text{ml/m}^2$ and $EF < 50\%$ have a less rate of maintaining sinus rhythm, these two parameters is a factor of poor prognosis in maintaining sinus rhythm after conversion.

Abhaiaratna and colleagues have made a prospective study on 574 adults over 65 years old, who were in sinus rhythm, without history of arrhythmias, valvular diseases or congenital diseases. Patients were followed for about 1,9 years from discovery on ECG of atrial fibrillation or atrial flutter. Left

atrial reservoir function was estimated using left atrial ejection fraction. Atrial fibrillation was more common in those with an ejection fraction $\leq 49\%$, compared with the fraction $> 49\%$. Atrial fibrillation was also more common in patients with atrial maximum volume $\geq 38\text{ml/m}^2$ to those with atrial maximum volume $< 38\text{ml/m}^2$. So an ejection fraction of 49% and a maximum volume of 38ml/m^2 predict atrial arrhythmia.

Dethy and colleagues considers that the left atrial size above 45mm has an important value, with a sensitivity of 66% and a specificity of 61% in the prediction of the frequency of recurrence of atrial fibrillation. Although the prognostic value of this parameter is questionable, his influence on the duration of maintaining sinus rhythm can not be denied. It was told a duration < 6 months in maintaining sinus rhythm in left atrial size $\geq 45\text{mm}$. In our study left atrial size did not significantly affect conversion of atrial fibrillation to sinus rhythm. This fact is confirmed by the results of the AFFIRM study, which revealed a weak correlation between left atrial size or left ventricle size and duration of sinus rhythm maintenance.

CONCLUSIONS

1. In this study was determined the most efficient method of converting atrial fibrillation and maintaining sinus rhythm between 2 ways of restoring sinus rhythm: electric conversion and pharmacological conversion. Thus electrical conversion should be considered as first line option to treat atrial fibrillation.
2. Restoring and maintaining sinus rhythm in atrial fibrillation is influenced by associated diseases, especially ischemic heart disease, it is preferable to carry out an assessment of the benefit/risk proportion in these patients before atrial fibrillation conversion.
3. As post conversion treatment, combination of Amiodarone 200mg/day + Bisoprolol 5mg/day + Converting enzyme inhibitor is the best choice.
4. Hypertension and dyslipidemia not significantly influence conversion and maintenance of sinus rhythm.
5. Left atrial size does not influence the conversion of atrial fibrillation to sinus rhythm or the maintenance of this pace.
6. Patients with $EF < 50\%$ and the maximum volume of LA $> 40\text{ml}$ should be monitored more often, these two parameters (left atrial reservoir functions) being a predictor factor of atrial fibrillation recurrence.
7. Restoration of atrial contraction removes intra – arterial stasis, reduces the incidence of migratory thrombus, it favors reducing the size of atrium. Therefore the restoration and maintenance of sinus rhythm seems to be the most appropriate option in atrial fibrillation.

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