

Analysis of the risk factors of valvular atrial fibrillation treated with radiofrequency ablation during valve replacement

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Abstract

Purpose

To investigate the risk factors of recurrence of atrial fibrillation(AF) after radiofrequency ablation in patients with rheumatic mitral stenosis with persistent atrial fibrillation.

Methods

From January 2015 to December 2018, patients undergoing radiofrequency ablation of rheumatic mitral stenosis complicated with persistent atrial fibrillation were collected. The patients were divided into sinus rhythm group(Group SR) and atrial fibrillation recurrence group (Group AR). collecting the data of preoperative echocardiography LV,LA,RA,RV,EF and gender, age, whether to combine diabetes, hypertension, etc. logistic regression was used to analyze the risk factors for atrial fibrillation recurrence.

Results

The success rate of 1 year after radiofrequency ablation was 76.8%. there was no difference in LV, LA, RV, RA, EF, and gender, age, diabetes, hypertension between the two groups, and there were no independent risk factors for recurrence of AF after radiofrequency ablation.

Conclusion

Rheumatic mitral stenosis with persistent atrial fibrillation has good therapeutic effect in patients undergoing radiofrequency ablation during valve replacement. LV, LA, RV, RA, EF, gender, age, diabetes, hypertension are not independent risk factors for recurrence of atrial fibrillation.

Background

Atrial fibrillation (AF) is a more common arrhythmia in clinic. some studies have shown that the proportion of patients with rheumatic heart disease in the population of atrial fibrillation patients in china is as high as 23.9%^[1], and the proportion of patients with rheumatic heart disease with atrial fibrillation is as high as 30%-50%^[2,3]. China's reports show that its proportion is as high as 40%-70%^[4,5]. Our hospital is located in southwest China, a high incidence of rheumatic heart disease, and in the clinical treatment of patients with atrial fibrillation rheumatic heart disease, the majority of patients with persistent atrial fibrillation. the effect of simultaneous atrial fibrillation radiofrequency ablation for atrial fibrillation in patients with open heart valve replacement is widely recognized, and its long-term benefit to patients is recognized ^[6]. We hope to find the risk factors that affect the failure of the re-law to improve the success rate of surgery. The aim of this study was to find the factors of recurrence of atrial fibrillation after

radiofrequency ablation for patients with rheumatic mitral stenosis associated with persistent atrial fibrillation. to more effectively predict the prognosis and screening of patients with atrial fibrillation radiofrequency ablation.

Methods

Patients selection:

Patients requiring surgical treatment due to rheumatic moderate-to-severe mitral stenosis with persistent atrial fibrillation in Sichuan Mianyang 404 Hospital from January 2015 to December 2018. Inclusion criteria: Moderate to severe rheumatic mitral stenosis with persistent atrial fibrillation (traceable atrial fibrillation greater than 6 months) Radiofrequency ablation of atrial fibrillation during replacement of artificial heart valve Cardiac function NYHA class II-III. Exclusion criteria: Paroxysmal auricular fibrillation Patients with cardiac function NYHA-IV No other underlying disease.

Surgery and drug treatment

These were performed by the same treatment team, using COX MAZE IV atrial fibrillation radiofrequency ablation of heart valve replacement and endocardial suture closure for left atrial appendage treatment. after the operation, the amiodarone injection 30-90 mg/h was continuously pumped into the vein for 48 hours, and after 48 hours, it was changed to oral amiodarone 200 mg/day until 3 months after the operation.

Follow-up and Grouping

The 24-hour Holter was reviewed at the outpatient clinic at 3 months, 6 months, and 1 year after the operation. According to the patient's 1-year postoperative period, whether the 24-hour Holter results maintained independently of antiarrhythmic drugs have a continuous room greater than 30 seconds Arrhythmia was divided into group SR and group AR for the endpoint of follow-up.

Collection of medical records

Collect preoperative cardiac color Doppler ultrasound data :LV (mm), LA (mm), RV (mm), RA (mm), EF (%), and gender, age, whether combined with diabetes or hypertension and other data.

Statistical analysis

The data processing was completed by SPSS 18.0 statistical software, and the variable data in accordance with the normal distribution were represented by $\pm s$, using t test for single factor analysis. The classification variables were expressed by count and percentage, and the chi-square test was used to compare the differences between groups. Logistic regression analysis of possible high risk factors in univariate analysis. $P < 0.05$ was considered statistically significant.

Results

General data:

A total of 84 eligible patients were included during the study period, which 69 were successfully followed up, with a follow-up success rate of 82.1%. There were 54 cases (78.3%), 53 cases (76.8%) and 53 cases (76.8%) of patients with random atrial arrhythmias without >30 s 24 hr results in 3 months, 6 months and 1 year after operation. Patients who were successfully followed up had no pacemaker placement and no deaths. Among them, In the SR group, there were 53 patients, including 20 males and 33 females, 10 patients with hypertension and 7 patients with diabetes. In the AR group, there were 16 patients, including 3 males and 13 females, 3 patients with hypertension and 2 patients with diabetes.

Comparison of basic data between the two groups

Data on preoperative gender, age, LA, LV, RA, RV, EF and the incidence of hypertension, diabetes etc between the two groups was no statistical difference ($P > 0.05$). (table 1)

Table 1: Comparison of basic preoperative data between the two groups

Group SR	Group AR	t/ chi-square value	p		
LA(mm)		51.11±10.11(m)	51.63±7.27	-0.188	0.851
LV(mm)		48.68±8.13	49.50±6.93	-0.365	0.716
RV(mm)		21.17±6.07	19.81±2.97	0.861	0.392
RA(mm)		50.41±8.40	50.06±7.87	0.149	0.882
EF(mm)		59.23±7.57	61.28±6.69	-0.974	0.334
diabetes		7(13.2%)	2(12.5%)	0.005	0.941
hypertension		10(18.9%)	3(18.8%)	0.000	0.992
gender				1.994	0.158
male		20	3		
female		33	13		
age		51.70±7.59	50.25±6.49	0.69	0.493

Logistic regression analysis

By binary logistic regression analysis, the relationship between LA, LV, RA, RV, EF, gender, age, hypertension, diabetes, and whether cardioversion was successful was performed using the Enter method as the independent variable screening method. The results are as follows (Table 2). No independent risk factors for recurrence of atrial fibrillation after radiofrequency ablation were found.

Table 2: Binary Logistic Regression Analysis Table

	B	S.E.	Wals	Sig.	Exp (B)	95% C.I.	
LV	.076	.052	2.104	.147	1.079	.974	1.195
LA	-.014	.041	.114	.736	.986	.911	1.068
RV	.005	.082	.003	.955	1.005	.855	1.181
RA	-.020	.048	.171	.679	.980	.891	1.078
EF	.045	.048	.885	.347	1.047	.952	1.151
gender ⁽¹⁾	-1.653	.969	2.910	.088	.192	.029	1.279
age	-.053	.047	1.232	.267	.949	.865	1.041
diabetes ⁽²⁾	-.136	.951	.020	.886	.873	.135	5.625
hypertension ⁽³⁾	.051	.808	.004	.949	1.053	.216	5.133
constant	-2.835	5.923	.229	.632	.059		

Variables entered in step 1: LV, LA, RV, RA, EF, gender, age, diabetes, hypertension.

(1) male ; (2)no diabetes ; (3) no hypertension

Discussion

The current success rate of surgical radiofrequency ablation for AF is about 63.2%-95%^[2,3,7-9]. Our study showed that patients with rheumatic heart disease during persistent atrial fibrillation had a maintenance rate of 76.8% of sinus rhythm in one year after surgical radiofrequency ablation during valve replacement. similar to the literature report. There is no consensus on the risk factors for recurrence of atrial fibrillation in rheumatic mitral stenosis with persistent atrial fibrillation. In existing studies, age, gender, left atrial diameter, hypertension, diabetes are all considered as possible high risk factors for atrial fibrillation recurrence after radiofrequency ablation. Most researchers believe that indexes such as atrial fibrillation type and left atrium size are the most important factors influencing the recurrence of radiofrequency ablation^[10]. In particular, many scholars have found that the greater the inner diameter of the left atrium through transcatheter radiofrequency ablation, the greater the possibility of failure of radiofrequency ablation for atrial fibrillation^[11-13]. However, there are few researches on surgical radiofrequency ablation of rheumatic heart disease with atrial fibrillation. In our clinical work, we will try to follow the results of catheter radiofrequency ablation to avoid radiofrequency atrial fibrillation for patients with a large left atrial diameter, and they will lose the operation to return to sinus rhythm opportunity. This reduces the quality of life after valve replacement. However, through our research, we found that in patients with rheumatic mitral stenosis during persistent atrial fibrillation, radiofrequency ablation during valve replacement, LA, LV, RA, RV, EF, gender, age, diabetes, and hypertension was not an independent risk factor for cardioversion failure. We believe that because the etiology of rheumatic heart

disease in combination with persistent atrial fibrillation is diverse^[14], the cause of the failure of the radiofrequency ablation is also the result of multi-cause co-action. In addition to our subjects, there may be factors such as the surgeon's proficiency, the type of atrial fibrillation, the electrical remodeling of the myocardium and structural remodeling. Some studies have found that patients with long course of atrial fibrillation have a significant decrease in their success rate of radiofrequency ablation^[11, 13, 15]. For the reasons for the selection of experimental subjects, we excluded the impact of the course and type of AF on the recurrence of AF. We found that gender may be an important factor affecting the failure of atrial fibrillation in such patients, male (OR 0.192 ,95% CI 0.029–1.279, p 0.088). It seems that men have a higher cardioversion success rate than women, and many catheter radiofrequency ablation procedures have reported similar results^[16, 17]. Pate and lee ' s study found that the high rate of female radiofrequency ablation regurgitation failure may be associated with higher BMI in women, more ectopic pacing points (non-pv trigers), and higher parasympathetic tension^[18, 19]. we will continue to improve the relevant research and expand the sample size to further verify the relevant results.

Conclusion

Surgical radiofrequency ablation during heart valve replacement has very good cardioversion effect and safety for valvular persistent atrial fibrillation.LA, LV, RA, RV, EF, gender, age, hypertension, and diabetes are not independent risk factors for recurrence of atrial fibrillation for valvular persistent atrial fibrillation. We recommend that patients with valvular persistent atrial fibrillation can perform radiofrequency ablation at the same time as valve replacement.

Abbreviations

AF

Atrial fibrillation

SR

Sinus rhythm group

AR

Atrial fibrillation recurrence group

NYHA

New York Heart Association

LV

Left ventricle

LA

Left atrium

RV

Right ventricle

RA

Right atrium

EF
Ejection fraction

Declarations

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None

Authors' contributions

Xuan Liu contributed to the conception of the study. Xuan Liu and Fengjuan Xiao contributed to the data collection and statistical analysis of the manuscript. Wei Xiong, Guo Xu and Shanglin Bai performed the surgeries. Xu Wu and Zhen Jia and Xia Jiang Outpatient follow-up and data collection. Kai She and Jixiang Wang helped perform the analysis with constructive discussions. All authors contributed to revisions of the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

All the data used in the present study are preserved in Department of Sichuan Mianyang 404 Hospital. The datasets used are available from the corresponding author on reasonable request

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Sichuan Mianyang 404 Hospital

Consent for publication

Obtained from the participants.

Competing interests

The authors declare that they have no competing interests.

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