

Study of Correlation of Left Atrial Size and Atrial Fibrillation in Rheumatic Mitral Valve Disease

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ABSTRACT

Aim: To study the correlation between Atrial Fibrillation (AF) and left atrial size in Rheumatic Mitral valve disease (RMVD). **Background:** AF is the most common sustained cardiac arrhythmia which is associated with increased cardiovascular morbidity, mortality and preventable stroke. AF is common in rheumatic heart disease (RHD) particularly mitral stenosis (MS). LA dilatation is the predisposing factor for the development of AF in RMVD. **Methodology:** This is a hospital based cross sectional descriptive study conducted in 52 patients who were diagnosed as RMVD clinically and echocardiographically in NGMCTH, Kohalpur between December 2018 to November 2019. Detailed history and complete clinical examination were performed. Standard 12 lead ECG and 2-D echocardiography were done. Left atrial size was measured and compared with patients in AF and with sinus rhythm. **Result:** The age of patients ranged from 20-76 years with the mean age of 40.33 years. Out of 52 patients 30 were in AF and 23 in sinus rhythm. Among 30 patients in AF, 27 (90%) had LA size ≥ 4 cm with mean LA size of 4.6 cm whereas among 22 patients in sinus rhythm, 14 (63.64%) had LA Size <4 cm with a mean of 3.83 cm. **Conclusion:** Left atrial size ≥ 4 cm is the predisposing factor for the development of AF in rheumatic mitral valve disease. Therefore, if patients in sinus rhythm who are at high risk of developing AF are identified, prophylactic anticoagulation and antiarrhythmic drug might prevent AF induced embolism and exacerbation of symptoms in rheumatic mitral valve disease.

Keywords: *Atrial fibrillation, ECG, Echocardiography, Left atrial size, Rheumatic mitral valve disease.*

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INTRODUCTION

Atrial Fibrillation (AF) is the most common sustained tachyarrhythmia. It is associated with increased cardiovascular morbidity, mortality and preventable stroke, accounting for approximately one-third of cardiac hospitalization for cardiac rhythm disturbance. The prevalence of AF is 0.4% to 1% in the general population and as high as 5% and 8% in patients older than 70 years and 80 years respectively suggesting its increment with age. AF is associated with increased risk of stroke, heart failure exacerbation and all cause mortality especially in women. The mortality rate in patients with AF is twice that of patients with normal sinus rhythm (NSR)¹.

AF commonly occurs as a consequence of left atrial dilatation and left atrial enlargement is one of the elements that evolve in the natural history of rheumatic mitral valve disease particularly mitral stenosis. AF also occurs with many other cardiac disorders including coronary artery disease, cardiomyopathy, mitral valve prolapse and mitral valve annular calcification². In a large surgical series, AF has been found in 40% cases with mitral stenosis and 25% of cases with mitral regurgitation³.

The obstruction to flow across the mitral valve leads to increased left atrial pressure with a rise in left atrial tension

and enlargement of the left atrium. The increase in wall tension causes changes in the electrophysiological and conduction properties and hence the perpetuation of AF⁴⁻⁷. In patients with normal sinus rhythm, who are at risk of developing AF if identified, prophylactic anticoagulant and anti arrhythmic drug may prevent AF induced embolic events.

Echocardiography is a noninvasive tool which has been proven to be valuable for measurement of left atrial size^{8,9}.

Studies regarding the correlation between left atrial size and AF in rheumatic mitral valve disease have been done at Western countries as well as in India. RMVD is not an uncommon disease in this part of Nepal but studies regarding LA size and AF are lacking. Hence this study was conducted.

MATERIAL AND METHODS

This is a hospital based cross sectional descriptive study conducted in 52 patients who were diagnosed as rheumatic mitral valve disease clinically and echocardiographically¹⁰ in NGMCTH, Kohalpur between December 2018 to November 2019. Informed consent from the patient and permission of the institutional review committee (IRC) of the hospital was also obtained. A detailed history and complete clinical examination were carried out. Each patient underwent standard 12 lead

ECG and 2D echocardiography (VIVID P3, GE Healthcare). AF was diagnosed if ECG showed absent P wave or fibrillatory f waves and irregular R-R interval¹¹.

LA size was measured in parasternal long axis view during echocardiography between the anterior margin of posterior aortic root and the anterior margin of posterior wall of LA. Left atrial dimension more than or equal to 4cm is considered to be dilated LA. Mitral valve area was obtained by planimetry and pressure half time (PHT). All patients with non-rheumatic mitral valve disease, hypertension, post PTMC or mitral valve replacement (MVR), coronary artery disease, congenital heart disease were excluded from the study.

Left atrial dimension in patients of rheumatic mitral valve disease with AF was compared with left atrial dimension of patients in sinus rhythm. Data were analyzed using standard stastical method including SPSS 20.0.

RESULT

A total of 52 patients with the diagnosis of rheumatic mitral valve disease were enrolled in the study. Age ranged from 20-76 years and the mean age was 40.33 years. There were 23 males and 29 females with M: F ratio of 0.8:1 showing a female preponderance.

The nature of the lesion in 52 patients studied was isolated MS in 21 patients (40.4%), isolated MR in 9 patients (17.3%) and both MS+MR in 22 patients (42.3%) as shown in table I.

RHEUMATIC Mitral valve disease (MVD)	No. of cases	Percentage
MS	21	40.4
MR	9	17.3
MS+MR	22	42.3
TOTAL	52	100

Table I: Nature of rheumatic mitral valve disease

For correlating age with rhythm, patients were divided into two groups, i.e. ≤30 years and >30 years. In age group ≤30 years out of 14 patients, 12 (85.72%) were in sinus rhythm and only 2 (14.28%) had AF. Whereas out of 38 patients in age group > 30 years, 28 patients (73.68%) had AF and 10 patients (26.32%) were in sinus rhythm, as shown in table II. P value was <0.001 which is statistically significant.

Age	Sinus rhythm	Af	Total	Percentage	P VALUE <0.001
≤30 YRS	12 (85.72%)	2 (14.28%)	14	26.9%	
>30 YRS	10 (26.32%)	28 (73.68%)	38	73.1%	

Table II: Correlation between age and rhythm

Out of 52 patients, 30 patients (57.70%) had AF whereas 22 (42.30%) patients were in sinus rhythm. Out of 30 AF patients, 27 (90%) had LA size ≥4 cm and only 3 patients (10%) had LA

size <4 cm, with a mean LA size of 4.6 cm. whereas out of 22 patients, who were in sinus rhythm, 8 (36.36%) had LA size ≥4 cm and 14 (63.64%) had LA size <4 cm with a mean LA size of 3.83 cm. The mean LA size in total 52 patients was 4.28 cm. The difference in LA size observed in patient with AF and sinus rhythm was statistically significant (P value <0.001).

Size	No. Of cases with sinus rhythm	No. Of cases with af	Total	Percentage	P VALUE <0.001
<4.0 cm	14 (63.64%)	3 (10%)	17	32.7	
≥4.0 cm	8 (36.36%)	27 (90%)	35	67.3	
Total	22 (42.3%)	30 (57.7%)	52	100.0	

Table III: Correlation between rhythm and LA size

La size (cm)	Total cases	No. Of cases with sinus rhythm	No. Of cases with af
3.1-4	17	14	3
4.1-5	30	8	22
5.1-6	4	0	4
6.1-7	1	0	1
TOTAL	52	22	30

Table IV: LA dimension on M- mode ECHO IN 52 cases

DISCUSSION

Rheumatic disease is the leading cause of mitral stenosis (MS). Isolated MS occurs in approximately 40% of all patients with RHD. In rest MS may accompany MR. The development of AF indicates a turning point in patients course and is associated with acceleration of the rate at which symptoms progress. LA dilatation is the predisposing factor for the development of AF.

Present study included 52 patients of rheumatic mitral valve disease and mean age was 40.33 years. In the age group >30 years, incidence of AF was 70.68%. similar report was shown by Mariyamballi R et¹² al in which incidence of AF was 71.4 %. Similarly Henry WL et al⁹ found incidence of AF to be 89.0% in the age group>40 years.

This study showed that as age advances, RMVD is complicated by development of AF.

In the present study, 90% of patients with AF had LA size ≥4.0 cm whereas only 10 % had LA size < 4.0 cm with the mean LA size of 4.6 cm. In the study done by Kulkarni et al¹³, 97.14% of patients with AF had LA size > 4 cm with average of 5.56 cm. Singh G et al¹⁴ found mean LA size of 5.02 cm in patients with rheumatic heart disease with AF.

Mariyamballi R et al¹² found 93.5% patients with AF had LA size >4cm with average 5.3 cm. In the study done by Gupta V et al¹⁵, 90.7% patients having AF had LA size >5 cm.

Similarly, in the study done by Henry WL et al⁹ 54% patients had AF when LA size was >4cm. Gad Keran et al¹⁶ concluded that LA size was larger (3.76±1.08 cm) in patients with MS. Mrozowska et al¹⁷ reported that AF was rare when LA size was ≥4 cm.

These results are comparable with present study which showed that AF commonly occurs when LA size is >4cm.

CONCLUSION

LA dilatation is the predisposing factor for the development of AF in patients with RMVD. Therefore if patients who have LA size > 4cm are identified, prophylactic anticoagulant and anti-arrhythmic drug might be used for preventing AF induced embolism and exacerbation of symptoms in RMVD.

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