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Correlation of LA size with atrial fibrillation in patients of mitral Valve disease and comparison with non-valvular heart disease

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Abstract

Background: Atrial fibrillation (AF) has become one of the most common sustained cardiac rhythm disturbance occurring mainly in MVD. Left atrial (LA) enlargement is one of the elements that evolve in the natural history of mitral stenosis.

Aims and Objectives: To study the LA size with AF among the patients with MVD and compare it with patients with non-valvular disease.

Materials and Methods: LA size of 67 patients with MVD were studied in a prospective, cross sectional and observational single center study and compared with 52 patients with non-valvular disease in the Department of Cardiology, Hamidia hospital, Gandhi Medical College, Bhopal, India. Confirmation of AF was performed using a standard 12 lead ECG. ECHO was used to measure the dimensions of LA in patients with MVD with AF and patients with non-valvular heart disease.

Results: Out of 67 patients with valvular disease, majority were having age more than 30 years (71.64%). LA size among the patients with MVD, majority of them had it between 41-50 mm (56.7%) followed by 51-60 mm (28.3%). Out of 97 patients who had LA size >40 mm, majority were had MVD (94%) as compared to those with non-valvular disease patients (65.4%) ($p < 0.001$).

Conclusion: AF is more prevalent among the patients with MVD. The incidence of AF is more common when the Left Atrial size exceeds 40mm.

Keywords: Atrial fibrillation, mitral Valve disease, non-valvular disease, Echocardiography

Introduction

Mitral Valve disease (MVD) can often lead to atrial fibrillation (AF). This is routinely reported among the patients undergoing surgery for DMR^[1]. MVD can lead to AF via multiple mechanism such as left atrial (LA) volume and pressure overload, progressive atrial fibrosis, LA enlargement, and electroanatomic remodeling^[2, 3].

In large surgical series, atrial fibrillation has been found in 40% cases with mitral stenosis and 25% of cases with mitral regurgitation^[4]. Advancement in LA enlargement and remodeling is a signature for long standing MVD, this is promoted by affecting cell coupling, altering conduction velocity, and promoting reentry^[5].

Echocardiography has proven to be a valuable noninvasive tool for quantitatively assessing left atrial size^[6, 7]. The Present study we tried to assess LA size with atrial fibrillation in patients of mitral valve disease and comparison with non-valvular heart disease.

Materials and Methods

Present study was a prospective, cross sectional and observational single center study. Sixty seven patients (n=67) having MVD were studied in the Department of Cardiology, Hamidia Hospital, Gandhi Medical College, Bhopal, India for 6 month from July 2018 to December 2018. As a control group 52 patients with non-valvular heart disease were also enrolled.

Detailed history was obtained and clinical examination was performed and recorded in pre-approved proforma. Patients with congenital heart diseases, rheumatic mitral valve disease, essential hypertension, patients already having undergone PTMC or valvuloplasty or valve replacement, coronary artery diseases, patients on antiarrhythmic drugs and pregnant women were excluded from the present study.

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Confirmation of AF was performed using a standard 12 lead ECG. AF was clinically documented if ECH showed irregular or undulating baseline, absent P-waves, presence of fibrillatory 'f' waves and varying R R interval.

Both the groups underwent routine blood and urine examination, a chest X ray, ECG and ECHO Examination. ECHO was used to measure the dimensions of LA in patients with MVD with AF and patients with non-valvular heart disease.

LA size was measured at end systole as a maximum distance between the anterior margin of posterior aortic root and the anterior margin of a posterior wall of LA at the aortic valve level. LA enlargement is considered to be present in left atrial dimension measured was more than or equal to 40 mm. MV area was obtained by planimetry.

All the data analysis was performed using SPSS ver.20 software. Frequency distribution and cross tabulation was performed to prepare the tables. Quantitative data was expressed as mean and standard deviation whereas qualitative data was expressed as percentage. Student t test and paired t test was used to compare the quantitative data. And Chi Square test was performed to compare percentage. P value of <0.05 was considered as significant.

Results

Out of 67 patients with valvular disease, majority were having age more than 30 years (71.64%), similarly in Control group also majority were having age above 30 years (69.23%).

Among the patients with valvular disease (n=67), most common was a combination of mitral stenosis and mitral regurgitation (47.7%) followed by mitral stenosis (40.3%) and mitral regurgitation (8.9%).

Table 1: Comparing the LA size between both the groups obtained by M Mode ECHO.

LA size (mm)	Patients with MVD (n=67)	Patients with non-valvular disease (n=52)	P value
21-30	0 (0)	0 (0)	NA
31-40	4 (6)	18 (34.6)	<0.001
41-50	38 (56.7)	28 (53.8)	0.042
51-60	19 (28.3)	6 (11.5)	0.022
61-70	4 (6)	0 (0)	0.002
71-80	2 (3)	0 (0)	0.034

Table 2: Comparing LA size (taking 40 mm as a cut off) between both the groups.

LA size (mm)	Patients with MVD (n=67)	Patients with non-valvular disease (n=52)	Total	P value
<40	4 (6)	18 (34.6)	22 (18.5)	<0.001
>40	63 (94)	34 (65.4)	97 (81.5)	<0.001
Total	67 (56.3)	52 (43.7)	119 (100)	

Discussion

Incidence of AF among the patients having age more than 60 years is 1% whereas those having age older than 69 years had the incidence of 5%. In present study out of 67 patients with valvular disease, majority were having age more than 30 years (71.64%), similarly in Control group also majority were having age above 30 years (69.23%). That means prevalence of AF is more among the patients with age more than 30 years. In line with that previous studies done by Henry WL *et al.* [7] and Jacob Jose *et al.* [8] found that incidence of AF was highest among the patients with age

>40 (89%) and >30 years (79%) respectively. This can be concluded from the data that increasing age (increase in duration of disease) can be an important predictor of the development of AF associated MVD.

In present study among the patients with valvular disease (n=67), most common was a combination of mitral stenosis and mitral regurgitation (47.7%) followed by mitral stenosis (40.3%) and mitral regurgitation (8.9%).

In present study LA size among the patients with MVD, majority of them had it between 41-50 mm (56.7%) followed by 51-60 mm (28.3%). Whereas among the patients with non-valvular disease, majority had LA size in the range of 41-50 mm (53.8%) followed by 31-40 mm (34.6%) and 51-60 mm (11.5%). The difference observed in LA size between the patients with MVD and those with non-valvular disease was highly significant which indicate that higher percentage of patients with MVD had LA size between 41-50 mm as compared to those with non valvular disease. To conclude increase in LA size is more common among the patients with MVD as compared to those with non-valvular disease. In line with present study findings, several previous authors have shown similar findings.

When a cut off of LA size was taken as 40 mm, it was found that out of 97 patients who had LA size >40 mm, majority were had MVD (94%) as compared to those with non-valvular disease patients (65.4%) ($p < 0.001$). This proves that patients with MVD had more LA size as compared to those with non-valvular disease. Henry WL *et al.* [7] showed that 54% patients had AF, when LA size was >40 mm, Gad Keran *et al.* [9] showed that LA size was larger (37.6+/-10.8 mm) in patients with the MS, Gupta V *et al.* [10] reported that 90.7% patients having AF had LA size more than 50 mm, Mrozowska *et al.* [11] reported that AF was rare when LA dimension was, G. Singh *et al.* [12] reported that Patients with RHD with a AF had mean LA size of 50.2 mm and Kulkarni AG *et al.* [13] showed that 97.14% of the patients with a AF had LA size >40 with an average of 55.6 mm. All these studies are in line with present study where 97% patients with a AF had LA size >40 mm with average of 48.45 mm.

Conclusion

Based on the present study findings it can be concluded that LA size is a significant factor in the development of AF, in patients with MVD. It was also revealed that incidence of AF seems to be rare among the patients with LA size <40 mm. Present study results may have therapeutic consequence in that it may be possible with ECHO, to identify patients with non-valvular disease, who are at high risk of developing AF.

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