

Frequency of Atrial Fibrillation in Mitral Stenosis and its Correlation with Left Atrial Size

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Introduction: Chronic rheumatic heart disease is much the commonest cause of mitral stenosis. Incidence of rheumatic MS parallels that of acute rheumatic fever. Atrial fibrillation usually develops in the presence of pre-existing ECG evidence of left atrial enlargement and is related to the size of the chamber, the extent of fibrosis of the left atrial myocardium, the duration of the atriomegaly and the age of the patient. **Study Design:** Descriptive **Setting:** Mayo Hospital, Lahore and Punjab Institute of Cardiology, Lahore **Type of sampling:** Convenient **No. of cases:** 129 consecutive cases of predominant mitral stenosis. 112 cases included in the final workup. **Results:** The frequency of AF in MS in this study was calculated as 25.9%. The correlation between AF and left atrial size was significant ($p = 0.000$). This was plotted on the scattergram (Figure No. 1), which shows a steep rise in the frequency of AF beyond a left atrial size of 70 mm.

Conclusions: Frequency of AF in patients with MS is 25.9%. The correlation between AF in MS and left atrial size is significant ($p = 0.000$).

Key words: Mitral stenosis, atrial fibrillation, left atrial size.

Chronic rheumatic heart disease is much the commonest cause of mitral stenosis. Incidence of rheumatic MS parallels that of acute rheumatic fever¹. Rheumatic involvement is present in 99% of the stenotic mitral valves excised at the time of mitral valve replacement. Approximately 25% of all the patients with rheumatic heart disease have pure MS and an additional 40% have combined MS and MR. Two third of all the patients with rheumatic MS are women². It is thus much commoner and present earlier in the Middle East, Indian sub-continent and far East than in the West¹. Atrial fibrillation usually develops in the presence of pre-existing ECG evidence of left atrial enlargement and is related to the size of the chamber, the extent of fibrosis of the left atrial myocardium, the duration of the atriomegaly and the age of the patient². 50%-80% of the patients develop paroxysmal or chronic atrial fibrillation that until the ventricular rate is controlled may precipitate dyspnea or pulmonary edema³. The objective of the study is to see the frequency of atrial fibrillation in MS and its correlation with left atrial size.

Patients & methods:

This descriptive study was conducted in the setting of Mayo Hospital, Lahore and Punjab Institute of Cardiology, Lahore. Patients were selected for interview on the basis of convenient sampling. The data was collected on a specially designed performa. One hundred and twenty nine consecutive patients of echocardiographically proved mitral stenosis, visiting the two institutions were contacted and the performa was filled for each patient. The data was later scrutinized and only 112 cases were included in the final workup.

All the patients were investigated with an ECG and an echocardiogram (to confirm mitral stenosis and to

measure anteroposterior left atrial dimensions on M-mode). All patients who were suffering from AF due to causes other than predominant mitral stenosis were excluded. Clinical analysis helped rule out non-cardiac causes of AF. Cardiac causes of AF other than MS were ruled out on the basis of echocardiography and ECG. Those cases of mitral stenosis that did not have a complete record, including treatment history and previous ECGs, were also excluded. Similarly the data of the patients, who had been interfered with either surgically or PTMC, was entered on the basis of their pre-surgical record.

The data analysis was computer based. SPSS 10 was employed for this purpose. The significance of the findings was tested through Student's "T" test.

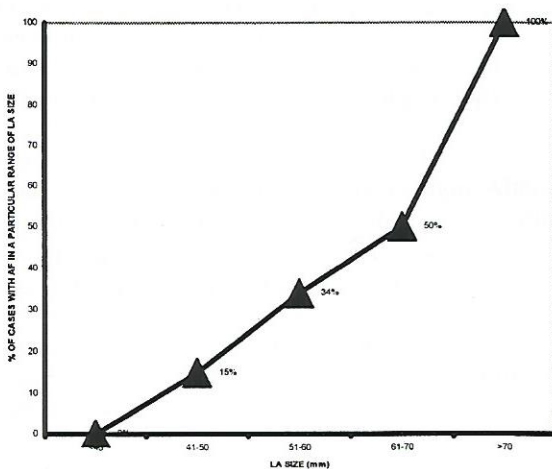
Results:

A total of 112 patients with echocardiographically proved predominant MS, who visited Mayo Hospital, Lahore and Punjab Institute of Cardiology, Lahore, were studied.

The age of these patients ranged from 7 to 73 years (mean age 28.88 ± 12.50). 2 (37.5%) of them were males and 70 (62.5%) were females. The frequency of AF in MS in this study was calculated as 25.9%. Out of 112 patients, 61 patients (54.5%) had pure MS. 51 patients (45.5%) had associated mild mitral regurgitation as recorded on Doppler examination. The mitral valve area ranged from 0.5 to 3.10 cm² with a mean value of 1.0469 ± 0.4146 cm². Only one patient had MVA of less than 0.5 cm². Using the general terminology of severity of MS, mild MS (MVA > 1.5 cm²) was seen in 14 cases (12.5%), moderate MS (MVA between 1.5 – 1.1 cm²) in 24 cases (21.4%) and severe MS (MVA ≤ 1.0 cm²) in 74 cases (66.1%). No obvious correlation ($p = 0.24$) could be discovered between AF and the severity of MS.

The left atrial size ranged from 33 to 80 mm (mean 50.91 ± 8.66). Thus using the value of 45 mm as a definite indicator of left atrial enlargement, 54 patients (48.2%) were found to have left atrial enlargement. The correlation between AF and left atrial size was significant ($p = 0.000$). This was plotted on the scattergram (Figure No. 1), which shows a steep rise in the frequency of AF beyond a left atrial size of 70 mm. No case of AF was recorded at a left atrial size of 40 mm or less. Even at the cut off value of 45 mm, only 2 cases (1.78%) had AF. There was a definite inverse correlation between the left atrial size and the MVA ($p = 0.017$), which when plotted on a scattergram showed a linear trend. The frequency of AF was found to increase with age ($p = 0.000$), which again revealed a linear trend. The left atrial size in patients with AF was larger than those in normal sinus rhythm; the mean value in AF being 56.72 ± 9.41 mm (range 42 – 80 mm) as compared to 48.88 ± 7.43 mm (33 – 67 mm) in sinus rhythm.

FIGURE NO. 1 CORRELATION OF AF WITH LA SIZE



Discussion:

The objective of this study was to calculate the frequency of AF in cases of MS and to correlate AF with left atrial size. A total of 112 patients with echocardiographically proved predominant MS, who visited Mayo Hospital, Lahore and Punjab Institute of Cardiology, Lahore, were studied. Multiple studies were carried out on this topic earlier in different parts of the world with varying results. The methods employed to confirm left atrial size were also different.

The frequency of AF in MS in our study was 25.9%, which was comparable to the value calculated by Diker et al⁴ (29%, who studied isolated MS), Augestad et al⁵ (35.4% who studied cases of MS that were subjected to commissurotomy) and Conradie et al⁶ (28.9%, who studied predominant MS). However, other studies reported a very high frequency including Mrozowska et al⁷ 72.3% (who

included cases of isolated mitral valve disease, not MS alone), Acarturk et al⁸ 45.8% (who studied predominant rheumatic MS) and Sanada et al⁹ 87% (who studied MS). Okubo et al¹⁰ has reported a very low incidence of AF in MS patients from Bangladesh.

Sixty one (54.5%) of our patients had pure MS whereas the rest (45.5%) had associated mild MR diagnosed on Doppler study. Sagie et al¹¹ reported that at least 78% of cases with MS had minimal/ mild MR detected on Doppler study and only 22% had pure MS.

Using the general terminology of severity of MS, mild MS ($MVA > 1.5 \text{ cm}^2$) was seen in 14 cases (12.5%), moderate MS (MVA between $1.5 - 1.1 \text{ cm}^2$) in 24 cases (21.4%) and severe MS ($MVA \leq 1.0 \text{ cm}^2$) in 74 cases (66.1%). Sagie et al¹¹ noted mild MS in 28%, moderate MS in 34% and severe MS in 38% cases.

The left atrial size in our study ranged from 33–80 mm (mean 50.91 ± 8.66). 54(48.2%) of our patients had definite left atrial enlargement (45 mm or more). The mean left atrial size calculated in valvular heart disease (79.4% pure MS) by Nadeem et al¹² was 52.44 ± 8.96 mm.

There was a significant and linear correlation between AF and left atrial size ($p=0.000$) as plotted in the scattergram (Fig. 1). Similar findings were cited by Nadeem et al¹², Keren et al¹³, Brodsky et al¹⁴, Mrozowska et al⁷, Framingham study¹⁵, Cardiovascular Health Study¹⁶, Henry et al¹⁷, Diker et al⁴ and Probst et al¹⁸. The last study, done in 1973, used cineangiography to define the left atrial size.

Conclusions:

Frequency of AF in patients with MS is 25.9%.

The correlation between AF in MS and left atrial size is significant ($p = 0.000$).

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