Correlation of Left Atrial Size with Atrial Fibrillation in Patients of Mitral Stenosis Undergoing Percutaneous Transluminal Mitral Commissurotomy

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ABSTRACT

Objective: To determine the frequency of atrial fibrillation in rheumatic mitral stenosis and to correlate it with left atrial size.

Materials and methods: This Cross sectional study was conducted at the Department of Cardiology, Punjab Institute of Cardiology, from Jan 2007 to August 2007. One hundred consecutive patients with mitral stenosis undergoing Percutaneous Transluminal Mitral Commissurotomy (PTMC), more than 18 years of age, admitted in Cardiology ward were enrolled in this study. Patients with ischemic heart disease, thyrotoxicosis, hypertension, chest infections and prior cardiopulmonary surgery were excluded. All patients underwent thyroid function tests, cardiac enzymes and complete blood examination. Baseline electrocardiogram, chest x-ray and echocardiography were also carried out. Other variables studied were the symptomatology.

Results: Out of one hundred patients, atrial fibrillation was noted in 35(35%) cases. The frequency of atrial fibrillation increased with age, being maximum (75%) after age 50 years. Similarly, there was a strong linear correlation between atrial fibrillation and left atrial size (r=0.0001). Dyspnoea was most common (78%) symptom, followed by palpitations (52%).

Conclusion: Rheumatic mitral stenosis is one of the commonest cause of atrial fibrilllation and increased left atrial size is associated with increased frequency of atrial fibrillation in patients with mitral stenosis undergoing PTMC.

Key Words: Atrial fibrillation, mitral stenosis, Left atrial size, Percutaneous Transluminal mitral Commissurotomy.

INTRODUCTION

Atrial fibrillation (AF) is the most common sustained arrhythmia in the World, occurring in approximately 0.4% of the general population.[1] The prevalence of AF increases with age, affecting upto 5% of the population over the age of 69 years.[2]

AF is most commonly associated with advanced age, hypertension, valvular heart disease, congestive cardiac failure and coronary artery disease. It has also been associated with physiological stress, drugs, pulmonary embolism, chronic lung disease, hyperthyroidism, caffeine, infections and various metabolic disturbances. Other less common cardiac associations include Wolf-Parkinsonism-White syndrome, pericarditis and cardiomyopathy. [3]

AF due to progressive dilatation of the left atrium in mitral stenosis is very common; its onset precipitates pulmonary edema.[4,5] Less than 20% of the patients remain in sinus rhythm, which is often associated with a small fibrotic left atrium and severe pulmonary hypertension. All patients are predisposed to left atrial thrombus and systemic thromboembolism previously account for 25% of all deaths in this condition, when anticoagulation therapy had not been available.[6,7]

Being a third world country, Pakistan is expected to host a huge number of cases of AF secondary to mitral stenosis with its associated complications. The purpose of the present study was to determine the frequency of AF in patients with mitral stenosis and to correlate AF with the size of left atrium of these patients.

MATERIALS AND METHODS

This observational cross sectional study was conducted at the Cardiology Department of Punjab Institute of Cardiology, Lahore from Jan 2007 to August 2007. 'Purposive sampling technique' was used to collect a sample of 100 diagnosed cases of predominant mitral stenosis (undergoing Percutaneous Transluminal Mitral Commissurotomy), aged more than 18 years. Patients with ischemic heart disease, thyrotoxicosis, hypertension, chest infections and prior cardiopulmonary surgery were excluded.

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Informed consent was taken and data recorded on a proforma. Proforma included the information regarding name, age, sex and address of the patient. The presenting complaints related to atrial fibrillation (AF) and mitral stenosis were recorded under heading of dyspnoea, orthopnea, paroxysmal nocturnal dyspnoea (PND), palpitation etc.

Patients had a thorough general physical and cardiovascular examination. All patients underwent thyroid function test, cardiac enzymes and complete blood examination. Baseline electrocardiogram (EKG), Chest X-ray (CXR) and echocardiography were also carried out. Both M-mode and 2-D echocardiographic examination was carried out to document left atrial (LA) size. LA diameter >40 mm was taken as significant. AF was defined on EKG as absent or fibrillatory P waves with narrow QRS complexes showing irregular R-R interval. Mitral stenosis was defined on echo as mild if MVA is >1.5cm, moderate if between 1.5-1.1 cm and severe if <1.0cm.

The data was analyzed through SPSS (Statistical Package for Social Sciences) version 12.0 for Windows. The variables included were age, sex, and symptoms. They were presented as simple descriptive statistics, giving means and standard deviation for the numerical data. The frequency of AF was calculated as percentages of total cases. Pearson's correlation co-efficient 'r' was calculated to find out the correlation of atrial fibrillation with left atrial size. For comparison of our frequencies/percentages with other studies, t-test of proportion was used. A p-value of 0.05 or less was taken as significant.

RESULTS

Out of 100 patients who were enrolled in the study, AF was noted in 35 patients (35%).The frequency of AF was 33.3% in male as compared to 36.2% in females. Among 100 patients 58 cases (58%) were female and 42 cases (42%) were male with male to female ratio of 1:1.38. Age range of the sample population was 18-60 with mean age of 31.09±10.19 years. The medico-demographics of the population are given in Table-1.

The frequency of AF increased with advancing age being lowest 21.8% among patients below 30 years, 46.2% in those age between 31-40 years, 53.3% in patients of 41-50 years of age, and highest 75% among patients above 50 years of age. The frequency of AF exhibited a significant correlation (r=0.01) of AF with age.

The frequency of AF increased with increasing LA size, being absent among patients with LA size below 45 mm, 11.5% in those with LA size of 46-50, 50% among patients with LA size of 51-55 mm, 73.7% if LA size was 56-60 mm and 100% if LA size was more than 60 mm. Thus there was a statistically significant association between AF and LA size (r=0.0001). Figure 1.

Clot in LA was found in 16(16%) patients. There was a strong correlation between AF and clot in LA (r =0.0001) as 11(68.8%) patients had AF. Also a non significant correlation was observed between AF and severity of mitral stenosis (r=0.23).

Many patients experienced more than one symptom. The most common symptom was Dyspnoea 78% followed by palpitation 52%. Three patients had history of stroke.

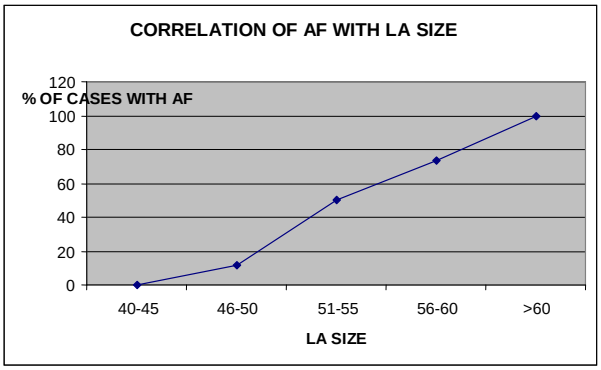
When the patients having AF were compared with those with sinus rhythm, mean age and LA size was found higher whereas mean mitral valve area was found relatively smaller in patients with AF. Table-2.

Table 1: Medico-demographic characteristics of the study population.

Characteristics	**=n**
Age (years)	
<30	55(55%)
31-40	26(26%)
41-50	15(15%)
>50	4(4%)
LA size	
<45	25(25%)
46-50	26(26%)
51-55	24(24%)
56-60	19(19%)
>60	6(6%)
Mitral valve area (cm^2)	
>1.5	0
1.1-1.5	36(36%)
<1.0	64(64%)

LA size=Left Atrial size

Fig. 1. Correlation of AF with LA size in patients with mitral stenosis.



AF=Atrial fibrillation; LA size=Left atrial size.

Table 2. Comparison of AF and sinus rhythm in patients with mitral stenosis.

Characteristics	Study population	Patients with AF	Patients with sinus rhythm
Mean age	31.09±10.1	35.49±10.88	28.72±9.04
Mean LA size	50.23±7.1	56.03±5.8	47.11±5.6
Mean MVA	0.94±0.27	0.92±0.23	0.95±0.28

DISCUSSION

In spite of rapid and significant advances in prevention and therapeutic modalities, Rheumatic heart disease (RHD) continues to be one of the biggest health challenge faced by third world countries in particular.[8] Therefore, we are expected to see atrial fibrillation secondary to mitral stenosis with its associated complications more frequently than other causes of AF.

In the present study, the frequency of AF in MS was 35%. This finding is comparable to the findings of Conradie et al[9] who reported that 28.9% cases of AF in patients with predominant MS. Augested et al[10] studied patients with MS that were subjected to commissurotomy reported frequency of AF to be 35.4%. Sims et al[11] studied patients undergoing mitral valve replacement and reported frequency of AF to be 45%. Acarturk et al[12] also reported frequency of AF to be 45.8%.

Chiang et al[13] found that there was no difference in frequency of AF with reference to sex of the patients. However Nadeem et al[14] have reported that AF was more common in females. In our study, 33.3% cases were male and 36.2% were female. So our results are comparable to presently reported estimates.

The male to female ratio in our study was 1:1.38 with maximum number of cases belonging to the mean age of 31.09±10.19.This is similar to studies carried out in this region[14-16] but different from those reported from western population e.g. Khatouri et al[17], Sanda et al[18] and Sagie et al[19] reported higher mean age of 40.3±9years, 51±10years and 61±14 years respectively.

The lower age group in our study was probably due to early referral to tertiary care centre because of lack of diagnostic facilities at basic health centre.

The frequency of AF increased with age in our study (p=0.01). The mean age for patients with AF was 35.49±10.88 years as compared to patients with sinus rhythm which was 28.72±9.04. This is similar to what had already been reported by Khatouri et al[17] (40.3±9years vs 31.4±9.5 years).

The presently reported study revealed that there was a significant linear correlation between AF and LA size (p=0.0001). Similar observations were made by Nadeem et al[14] and Mrozowska et al[20]. The mean LA size of patients with AF was larger than patients with sinus rhythm (56.03±5.8mm vs 47.11±5.6mm). This is similar to what has already been reported by Sims et al[11] (60 vs 52 mm), Khatouri et al [17](53.3±10.3 mm vs 46.5±8.5 mm) and Keren et al[21] (37.8±10.8 mm vs 27.8±7.7 mm).

In the present study, frequency of clot in LA in patients with AF was found in 11 out of 35 cases (31.4%). Acarturk et al [17] reported clot in LA in 20.8% patients with AF.

The prevalence of shortness of breath was about 78%, palpitations 52% and stroke 3% in our study. Augestad et al[10] reported the prevalence of dyspnoea in 98.9%, palpitations in 35.4% and stroke in 15 out of 216 patients (5.07%) of cases which is comparable to our results.

CONCLUSION

Rheumatic mitral stenosis is one of the major causes of atrial fibrillation and there is increased frequency of atrial fibrillation with increasing left atrial size. The prevalence of rheumatic mitral stenosis and atrial fibrillation could be decreased by early detection and treatment of rheumatic fever.

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