

Differences in Clinical Profile and Echocardiographic Findings in Patients with Valvular Vs Non-valvular Origin of Atrial Fibrillation.

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Atrial fibrillation (A Fib) is a common cardiac arrhythmia. Major causes include valvular and non-valvular. Prevalence of rheumatic/valvular origin is commonly observed but non-valvular diseases are also manifest in A Fib. The age, gender, left atrial size and presence or absence of thrombus in left atrium affects the outcome and associated morbidity and mortality. We evaluated 70 consecutive patients of A Fib to find out differences in clinical and Echocardiographic findings in valvular and non-valvular origin of A Fib. Seventy (31 males, 39 females) patients of A Fib were divided into valvular and non-valvular groups. There were 34 (48.16%) patients (22 females) in valvular group, out of which 27 (79.41%) had pure mitral stenosis (16 females) and 5 (14.70%) mixed mitral valve disease. In non-valvular group 36 (51.84%) patients (19 males) were observed, out of these 9 (15%) had hypertension, 12 (33.3%) coronary artery disease. Mean age in valvular group was 40.09 ± 11.99 years and 61.42 ± 13.23 years in non-valvular one. Ejection fraction was more ($54.68 \pm 10.45\%$) in valvular group. Increased LA size of $52.44 \pm 8.96\%$ noted in valvular group. A Fib is the commonest arrhythmia seen at relatively younger age, more common in females and with enlarged left atrium in valvular heart disease as compared to non-valvular group where it is seen at older age, in males and with relatively less enlarged left atrium. Early recognition and treatment of atrial fibrillation may help to reduce the occurrence of atrial fibrillation and its associated sequel.

KEY WORDS: Atrial fibrillation, Risk Factors, Valvular, Non-valvular, Enlarged Left Atrium,

Lewis first described Atrial fibrillation electrocardiographically in 1909. It is a common cardiac arrhythmia. It requires early diagnosis and proper management to prevent long term complications associated with it.¹

The prevalence of atrial fibrillation (A Fib) is 1% in the United States. Its incidence is age related, increases with age rising to 10% over the age of 70 years.^{2,3}

Atrial fibrillation has strong association with left atrial diameter. When patients in sinus rhythm are compared with patients in atrial fibrillation (recurrent or chronic atrial fibrillation), the patient in sinus rhythm has an average smaller mean left atrial diameter, determined echocardiographically (4 cm Vs 4.4 cm).⁴

Atrial fibrillation is associated with high incidence of morbidity such as stroke, syncope and heart failure.⁵ The mortality from embolic stroke is considerably high in patients with atrial fibrillation (23%) when compared with patients in sinus rhythm (8%).⁶

There are numerous cardiac and non-cardiac risk factors for atrial fibrillation. In Western population hypertensive and ischemic heart diseases are at the top in causing atrial fibrillation, as compared to rheumatic heart disease and thyrotoxicosis, which are declining in number.^{1,3}

Determining the risk factors are important as modification and instituting the timely treatment would be helpful in reducing the incidence of atrial fibrillation and its associated complications.⁷

Aims and Objectives

1. To diagnose the patients with atrial fibrillation.
2. To see the differences in clinical and

Echocardiographic findings in patients with valvular and non-valvular origin of atrial Fibrillation.

Materials And Methods

This study was conducted in East Medical Ward of Mayo Hospital, Lahore, during February to July 1998. Seventy (70) consecutive patients of A Fib presenting to Emergency and Out patients Departments included in the study. Electrocardiogram (ECG) was performed in all cases. To determine the cause of atrial fibrillation, the detailed history was taken and systemic examination was performed. Regarding the history special emphasis was given to history of rheumatic fever, diabetes, hypertension, ischemic heart disease, chronic obstructive pulmonary disease (COPD), chest infection or any other infection in the body and symptoms of thyrotoxicosis.

Echocardiography was performed in every case of A Fib. Thyroid function tests were performed only in selected patients particularly in those which had clinical suspicion of thyroid disease or in those cases in which we could not find out the cause of A Fib i.e., lone atrial fibrillation.

Statistical Evaluation

The arithmetic mean of the observations was first calculated. The standard deviation and significance were than calculated with the help of Student's t test.^{8,9}

Results

A total of seventy (70) patients with atrial fibrillation were included in this study. There were 31 (44.3%) male and 39 (55.7%) female patients. The patients were divided into two groups, valvular and non-valvular,

depending upon the etiology of A Fib. There were 34 (48.6%) patients in valvular group, among them 12 (35%) were male and 22 (65%) female. In the non-valvular group there were 36 (51.4%) patients, among them 19 (51%) were male and 17 (49%) were female.

The mean age in valvular group was 40.09 ± 11.99 years and in non-valvular group 61.42 ± 13.23 years. The difference between the two groups is statistically significant and the patients who develop A Fib due to underlying valvular disease do so at a significantly younger age (table - 1). The mean age in male patients was found to be 39.25 ± 12.96 years in valvular group and 59.95 ± 36.06 years in non-valvular group. Similarly mean age of female patients was 40.55 ± 11.72 years in the valvular group as opposed to 63.06 ± 11.79 years in non-valvular group. The comparison between the ages, in the valvular and non-valvular groups, in male patients was statistically significant. In the female patient, the comparison between the ages of valvular and non-valvular group was more significant (table - 1). The number of patients varies with age and was distributed in different age groups (table -2).

Table - 1 comparison between ages and gender of patients with valvular and non-valvular causes of atrial fibrillation

Comparison of Age in Years	Mean \pm SD	
Valvular	40.09 ± 11.99	
Non-valvular	61.42 ± 13.23	
p value = <0.001		
Comparison of Age in years	Mean \pm SD	
	Male Female	
Valvular	39.25 ± 12.96 (12)	40.55 ± 11.72 (22)
Non-valvular	59.95 ± 36.63 (19)	63.06 ± 11.79 (17)
p value p <0.05		p <0.001

The figures in parenthesis indicate No. of patients.

Table - 2 Number Of Patients In Different Age Groups

Age Group	Male	Female	n=
20-29	3 (4.29%)	3 (4.29%)	6 (8.57%)
30-39	6 (8.57%)	9 (12.86%)	15 (21.42%)
40-49	4 (5.71%)	7 (10%)	11 (15.71%)
50-59	4 (5.71%)	5 (7.14%)	9 (12.85%)
60-69	8 (11.43%)	11 (15.71%)	19 (27.14%)
70-79	5 (7.14%)	1 (1.43%)	6 (8.57%)
80-89	1 (1.43%)	3 (4.29%)	4 (5.71%)
Total	31 (44.29%)	39 (55.71%)	70 (100%)

These patients were divided into two groups, i.e. valvular and non-valvular. In the valvular group there were 34 cases. Among these 16 (47%) patients had history of rheumatic fever in the past, while 18 (53%) had no history. In valvular group, the pure mitral stenosis was the predominant lesion being present in 27 (79.41%) patients out of these, 16 were female and 11 male. It showed that mitral stenosis is predominant lesion in female patients. Mitral stenosis combined with mitral regurgitation was found in 5 (14.70%) patients and mitral stenosis with aortic stenosis was found in 1 (2.94%) patient. One (2.94%) patient had pure mitral regurgitation.

The non-valvular group comprised of 36 patients with the following distribution of various risk factors given in table - 3. In non-valvular group hypertension and coronary artery disease were found to be major risk factors for A Fib followed by lone A Fib, dilated cardiomyopathy and thyrotoxicosis. Pericardial effusion, constrictive pericarditis, COPD and severe infection were found to be rare causes of atrial fibrillation.

Table - 3 Sub-Classification Of Risk Factors In Non-Valvular Group

Risk Factors	Male	Female	Total
CAD	10 (52.6%)	2 (11.8%)	12 (33.3%)
HTN	3 (15.8%)	6 (35.3%)	9 (25%)
Lone A Fib	3 (15.8%)	2 (11.7%)	5 (14%)
Thyrotoxicosis	1 (5.3%)	2 (11.7%)	3 (8.3%)
DCM	0 (0%)	3 (17.6%)	3 (8.3%)
Pericardial effusion	1 (5.3%)	0 (0%)	1 (2.7%)
Constrictive pericarditis	0 (0%)	1 (5.9%)	1 (2.7%)
Severe infection	1 (5.3%)	0 (0%)	1 (2.7%)
COPD	0 (0%)	1 (5.9%)	1 (2.7%)
Total	19 (100%)	17 (100%)	36 (100%)

CAD= Coronary artery disease. HTN= Hypertension DCM= Dilated cardiomyopathy COPD= Chronic obstructive pulmonary disease.

In the age group of patients <50 years there were 32 patients, out of which 26 patients belonged to valvular group and 6 patients belonged to non-valvular group. In the age group of patients >50 years there were 38 patients, out of which 30 patients belonged to non-valvular group and 8 patients belonged to valvular group. Table - 4 shows that in younger age group <50 years, valvular heart disease was the predominant cause of A Fib, while in elderly group of >50 years of age non-valvular etiology is the major risk factor, which is highly significant statistically. A number of patients belonging to valvular and non-valvular groups varied with each decade. It was observed that the number of patients, who belonged to valvular group were much more as compared to number of patients in the non-valvular group, in the 2nd, 3rd and the 4th decade. In the 5th and 6th decade more patients belonged to non-valvular group, whereas, in the 7th and 8th decade, all patients belonged to non-valvular group.

Table - 4 Frequency of valvular and non-valvular lesion in two age groups (<50 years vs >50 years)

Age(Years)	Frequency of valvular lesion	Frequency of non-valvular lesion	n=
<50	26	6	32
>50	8	30	38
Total	34	36	70

p value = < 0.001

Ejection fraction of all cases were determined by echocardiography (table - 5). The mean ejection fraction was $54.68 \pm 10.45\%$ in valvular heart disease. The mean ejection fraction was $45 \pm 9.95\%$ in ischemic heart disease. The mean ejection fraction was $52.56 \pm 5\%$ in hypertensive patients. The mean ejection fraction was $69.8 \pm 8.38\%$ in cases of lone atrial fibrillation. The mean ejection fraction of $45.67 \pm 7.51\%$ was noted in thyrotoxic patients. The mean ejection fraction was $23.33 \pm 5.77\%$ in dilated cardiomyopathy. It was observed that dilated cardiomyopathy was associated

with lowest ejection fraction whereas cases of lone A Fib had maximum one.

Table -5 Mean Ejection Fraction In Different Etiological Factors For Atrial Fibrillation

Risk factors	n=	Ejection Fraction (%) Mean ± SD
Valvular heart diseases	34	54.68 ± 10.45
Ischemic heart disease	12	45 ± 9.95
Hypertension	9	52.56 ± 5
Lone atrial fibrillation	5	69.8 ± 8.38
Thyrotoxicosis	3	45.67 ± 7.51
Dilated cardiomyopathy	3	23.33 ± 5.77
Pericardial effusion	1	50 ± 0
Constrictive pericarditis	1	50 ± 0
COPD	1	40 ± 0
Severe infection	1	55 ± 0

Atrial Fibrillation is associated with increase in left atrial (LA) size. Normal LA size is 19-39 mm. In our study the mean LA size was found to be 46.34 mm. It was observed that mean LA size was more in valvular group, as compared to non-valvular group. The mean LA size was 52.44 ± 8.96 mm in cases underlying valvular disease and 40.58 ± 5.14 mm in cases without it (table-6).

Table - 6 Left Atrial Size In Valvular And Non-Valvular Groups

Group	No. of cases	% age of cases	LA size Mean ± SD
Valvular	34	48.57%	52.44 ± 8.96
Non-valvular	36	51.43%	40.58 ± 5.14

p value = 0.001

Atrial fibrillation was associated with 2 major complications i.e., haemodynamic derangement and risk of embolisation. In our study, 40 (57.14%) patients presented with symptoms of heart failure and 5 (7.14%) with thromboembolic complication. Out of 5 patients with thromboembolic phenomenon, 4 had cerebrovascular accident confirmed on CT examination and one patient had peripheral embolus, confirmed by Doppler flow study of ischemic limb. Out of 5 cases that presented with thromboembolic event, 2 belonged to valvular group and 3 patients belonged to non-valvular group. Twenty-five (35.71%) patients had no complications.

Discussion

Atrial fibrillation is the commonest chronic or recurrent arrhythmia. Its incidence is age related, increases with advanced age and may be seen in more than 10% of patients of over 70 years.^{2,3,12} In our study the maximum number of patients were in their 60's. This is because cardiac risk factors increase as the age advances. The number of patients was less in seventies and in eighties. This was probably because of average life expectancy in our country is less as compared to the Western countries. The mean age was found to be 40.09 ± 11.99 years in patients having underlying valvular disease, while mean age was 61.42 ± 13.23 years in patients of non-valvular group. The difference between the two mean ages was found significant statistically. Since rheumatic fever is more prevalent in Pakistan that mostly affects younger

age (5-15 years) and chronic rheumatic endocarditis in valvular heart disease occurs quite earlier therefore A Fib presents at relatively younger age. Hypertension and coronary artery disease were two major risk factors in non-valvular group and both seen in later years, therefore patients in non-valvular group had higher mean age.

Gender also affected the incidence of atrial fibrillation and it was more frequently found in female as compared to male (55.7% Vs 44.3%). This is more or less consistent with other studies, (table 7).^{7,11}

Table - 7 Comparison Of Percentage Of Gender And Risk Factors In Some Of The Internationally Conducted Studies

Author	Year	Men (%)	Women (%)	Risk Factors	
				Valvular Heart Diseases	Non Valvular Heart Diseases
Kannel et al ³	1982	50	50	18%	82%
Gelder et al ¹⁰	1991			31.1%	68.3%
Benjamin et al ⁷	1994	47	53	23.1%	76.9%
Tahir and Ahmad ¹¹	1996	46.5	53.5	34.5%	65.5%
Our study	1998	44.3	55.7	48.6%	51.4%

We found rheumatic valvular heart disease to be the main risk factor for atrial fibrillation which was quite in contrast with other internationally conducted studies.^{3,7,10,11} The decline in incidence of rheumatic fever in West parallels with the reduction in all streptococcal infection, largely due to improved sanitation and the use of antibiotics.¹³ In valvular group, 47% of our patients had history of rheumatic fever. Rheumatic valvular heart disease and mitral stenosis are predominant in female. This was also found to be true in our study group, which is low in percentage as compared to other international studies.^{7,10,14} The reason is probably that hypertension and coronary artery disease are common in Western countries where as rheumatic valvular heart disease is common in our country.

The non-valvular heart disease accounted for 36 (51.4%) patients and the rheumatic valvular disease accounted for 34 (48.6%) patients for atrial fibrillation. This were found to be different from other internationally conducted studies (table - 7).

The incidence of lone A Fib is quite variable in different studies. In our study lone A Fib accounted for 14% of non-valvular group which is quite comparable with Gelder's 1991 study, who found that 15% of his atrial fibrillation were of lone atrial fibrillation.¹⁰

Atrial fibrillation is associated with large LA size. The normal LA size is 19-39 mm (measured by M-mode Echocardiography). In our study group, the mean LA size, in valvular group was 52.44 ± 8.96 mm and in non-valvular group 40.58 ± 5.14 mm. The LA size was found to be larger as compared to Flaker's 1995 study.⁴ In his study the mean LA size was 44 mm. No discrimination of valvular and non-valvular lesions was done in that study. The mean LA size in our cases with valvular lesion was more (52.44 mm) than that in the above mentioned study. On the contrary the mean LA size of non-valvular group in our study was less (40.58 mm)

less than that in the study of Flaker et al. Combined mean of our cases (46.34 mm) is nearer to that of the mean of Flaker et al (44 mm). A slight difference on the higher side was due to the higher contribution of rheumatic valvular disease in our study compared to their study. This is expected to be so on the basis of differences in the incidence of rheumatic fever between Western and third world countries.

Hypertension and coronary artery disease usually coexist.¹⁵ The modification and proper control of these factors are essential. The proper early treatment of hypertension and coronary artery disease may help to reduce the incidence of A Fib. COPD, severe infection, pericardial effusion, constrictive pericarditis and dilated cardiomyopathy are rare risk factors and should be treated accordingly.

As A Fib is associated with increased incidence of thromboembolic and haemodynamic complications, the need for converting A Fib to sinus rhythm is important. A Fib itself causes electrical changes in the atria, thereby encouraging the progression of paroxysmal A Fib into chronic A Fib (Atrial fibrillation begets atrial fibrillation).¹⁶ It has also been shown that paroxysmal A Fib itself increases haemoconcentration, enhanced platelet aggregation and coagulation, so may increase the incidence of thromboembolism.¹⁷ That is why, patients of chronic atrial fibrillation should have anticoagulant treatment.

In some cases of A Fib it is difficult to convert into sinus rhythm by chemical or electrical means. This is especially so in cases of chronic A Fib, having large LA size. In such cases physician should prescribe rate-controlling drugs along with anticoagulant treatment to prevent thromboembolic complication.

Summary

Patients with valvular origin of atrial fibrillation were relatively younger females with enlarged left atrium and more or less preserved left ventricular function as determined by Echocardiography. The incidence of left atrial thrombus was less in these patients. On contrast the patients with non-valvular lesions were old, males with less enlargement of left atrium and decreased left ventricular ejection fraction, more incidence of clot in left atrium and more tendency to embolize.

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