



“A STUDY OF CLINICAL PROFILE OF ATRIAL FIBRILLATION AND ITS TRANSTHORACIC ECHOCARDIOGRAPHY PRESENTATION, A CROSS SECTIONAL STUDY AT A TERTIARY CARE HOSPITAL IN JAIPUR”

Cardiology

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KEYWORDS

INTRODUCTION:

Atrial fibrillation (AF) is the most common sustained arrhythmia seen in clinical practice. It is marked by disorganized, rapid, and irregular atrial activation. The ventricular response to the rapid atrial activation also tends to be rapid. Patients with chronic AF may require long term treatment with potent antiarrhythmic and anticoagulant drugs.

AF is a common cardiac rhythm disturbance and increases in prevalence with advancing age. Approximately 1% of patients with AF are <60 years of age, whereas up to 12% of patients are 75 to 84 years of age (1). More than one third of patients with AF are ≥80 years of age (2,3).

The adjusted incidence and prevalence of AF is roughly double for each advancing decade of life, and, at any given age, men have an ≈50% higher incidence of AF than women (5).

Clinical consequences are related to rapid ventricular rates, loss of atrial contribution to ventricular filling, and predisposition to thrombus formation in the left atrial appendage and left atrium with potential embolization.

Presentations vary with the ventricular rate and underlying heart disease and comorbidities. Many patients are asymptomatic. The most common symptoms of AF are palpitations, fatigue, dyspnea, effort intolerance, and lightheadedness.

Paroxysmal AF is defined as episodes that start and stop spontaneously within 7 days. Persistent AF has a longer duration, exceeding 7 days, and, in many cases, will continue unless cardioversion is performed. In patients with long-standing persistent AF (>1 year), significant structural changes are present in the atrium that support reentry and automaticity, making it difficult to restore and maintain sinus rhythm.

Rheumatic heart disease is still remains the most common cause of AF in India (6), while it is found less commonly in the developed countries.

AF is associated with increased risk of developing heart failure. AF increases the risk of stroke by fivefold and is estimated to be the cause of 25% of strokes in elderly (7)

Methodology:

All adult patients (18 years or above) presented with AF, admitted in CCU at Mahatma Gandhi Hospital, Jaipur were included in the study for 6 months after obtaining their written informed consent. Patients with AF were analysed in this study, and their general and clinical data was included in the proforma.

Patient's age, sex, clinical symptoms and past history of Systemic Hypertension, RHD, CAD, COPD, Hyperthyroidism, Cardio myopathy, Congenital heart disease, Stroke, and treatment history, were taken into account.

Diagnosis of AF was done by absent P waves, fibrillatory (F) waves, irregularly irregular ventricular rate in ECG were taken as the evidence for AF.

Evaluation regarding etiology of AF was done by using ECG and Transthoracic echocardiogram (TTE), CXR, were done in all patients. In our study, all patients were subjected to detailed echocardiography done by Phillips EPIQ 7C to find out the presence of regional wall motion abnormalities, Structural heart disease like congenital heart diseases, hypertensive heart disease, and dilated cardiomyopathies, hypertrophic cardiomyopathy.

The patients not found to have any cardiac anomaly on echocardiography were subjected to pulmonary function tests and thyroid function test. Patients not found to have any cardiac or pulmonary disease and normal thyroid function tests were labeled to have lone AF

TTE was done in all patients and the following parameters were assessed.

1. LV diameter in systole and diastole were taken.
 2. LA size
 3. Ejection fraction%, RA size, RV size, To see left atrial or left atrial appendage clot.
 4. Right ventricular free wall contractility and Tricuspid Annular Plane systolic excursion were also seen.
 5. Mitral valve area was obtained by planimetry and pressure half time in patients with MS.
- Grading of MS depending on mitral valve area was done as follows:

Mild MS – >1.5cm², Moderate MS – 1.0 to 1.5cm². Severe MS – less than 1 cm² (8)

6. Left atrial diameter was categorized as a sex-specific variable, such that left atrial enlargement was defined as a left atrial diameter of 4.1 cm or greater in men or 3.9 cm or greater in women; a left atrial diameter below these values defined normal left atrial size.

- Left atrial enlargement was further classified as mild (left atrial diameter 4.1–4.6 cm in men or 3.9–4.2 cm in women), moderate (4.7–5.1 cm in men or 4.3–4.6 cm in women) or severe (≥ 5.2 cm in men or ≥ 4.7 cm in women) in accordance with the recommendations of the American Society of Echocardiography (9)

7. According to ACC heart failure guidelines 2013, ejection fraction was taken as followed:

Hyperdynamic = LVEF > 70%, Normal = LVEF 50% - 70% (midpoint 60%), Mild dysfunction = LVEF 40% - 49%, Moderate dysfunction = LVEF 30% - 39%, Severe dysfunction = LVEF < 30%

RESULTS:

Table 1: Baseline Characteristics:-

S.no	Total Number of cases	100
1.	Mean age in years	44.71±13.44 years
2.	Males	32(32%)
3.	Females	68(68%)
4.	Hypertension	7(7%)
5.	T2DM	10(10%)

Table 2 Various symptoms reported by patient were:-

S.no	Symptoms	Prevalence
1.	Shortness of breath	66%
2.	Chest pain	35%
3.	Palpitation	72%
4.	Syncope	6%
5.	Fatigue	28%
6.	Limb weakness	1%

Table 3 Age distribution Among RHD and RHD patient of AF:-

	NON RHD (n=23)	RHD (n=77)	Total (n=100)
AGE GROUP			
< 20 yrs	0(0%)	1(1.3%)	1(1%)
21 - 40 yrs	7(30.4%)	56(72.7%)	63(63%)
41 - 60 yrs	10(43.5%)	20(26%)	30(30%)
> 60 yrs	6(26.1%)	0(0%)	6(6%)
Total	23	77	100

Table 4 Mean Age of RHD and Non RHD Patients:-

AGE	N	Mean Age	P Value
Non RHD	23	52±13.3	<.00001
RHD	77	36±7.97	

Table 5 Heart failure in RHD patient with AF

FAILURE	ETIOLOGY	TOTAL	P Value
	Non RHD No. (%)	RHD No. (%)	
No. (YES)	9(39.1%)	32(41.6%)	0.0432
No. (NO)	14(60.9%)	45(58.4%)	
Total	23	77	

Table 6 Valvular lesions in patients with RHD

S.No	Valvular abnormality	Prevalence(n=77)
1.	Isolated MS	32(41.5%)
2.	Both MS/MR	10(12.2%)
3.	Isolated MR	12(15.5%)
4.	MR + AR	18(23.3%)
5.	MS + MR+AR	4(5.3%)
6.	Organic Tricuspid valve disease	1(1.29%)

DISCUSSION

This study included 100 patients diagnosed with AF who were examined and investigated in detail with regard to history, clinical data of these cases with reference to etiological factors, complications, electrocardiographic and echocardiography findings.

Age:

In our study, four age groups were made;

1. < 20 years
2. 21-40 years
3. 41-60 years
4. >60 years

The age of the patients varied from 19 to 85 years with the mean age of the total study group was 44.71±13.44 years. The mean age of RHD group was 36±7.970 years; non RHD group was 52±13.347 years. The youngest patient was 19 years old and oldest patient was 85 years old. The maximum numbers of cases were seen between age group 21-40 years 63%. The mean age of AF patients observed in two Indian studies by Sharma et al and Gurpal Singh et al (10) were 40±7 years and 57.33 years respectively. In the Framingham study (11), 2325 men and 2826 women, 30 to 62 years old at entry were followed biennially over 22 years for the development of chronic AF in relation to antecedent cardiovascular disease and risk factors. The incidence rose sharply with age. Over all there was a 2.0 percent chance that the disorder would develop in two decades. The prevalence of atrial fibrillation is 0.5% for the group aged 50-59 years and rises to 8.8% in the group aged 80 to 89 years (12).

In our study 4 cases included in the study were more than 50 years of age, this was in line with the Indian study done by Saroj K Prakash and Sudesh K Chugh (13), which noted that all cases of atrial fibrillation

due to coronary artery disease were above 50 years. Age of the AF patients in study was lower because most of our patients of AF were of RHD.

This age distribution compares well with the other studies by Rose G Baxter et al(14), Campbell A et al (15), Kitchin AH and Milen JS.

These studies were conducted in the western population, where the major cardiac precursors of atrial fibrillation are hypertensive and coronary artery disease. Unlike in the western population, there is a higher incidence of rheumatic heart disease in the Indian population which affects the various age groups.

In our study 77% cases of atrial fibrillation were found to be Rheumatic in origin and only 11% cases were due to CAD and hypertension, which was similar to findings by A vora.

In another Indian study done by R Bhardwaj, commonest cause of AF was RHD, found in more than 60% of cases.

Since rheumatic heart disease accounts for majority of cases of atrial fibrillation in our population, an incidence at an earlier age is expected.

Sex:

In our study females were more than men. Of the total 100 patients enrolled in the study, 68 were female and 32 were male. Females outnumbered males in the three Indian studies done by Sharma et al, Gurpal Singh et al (10), Bhardwaj R. The study by Davidson et al who observed the female - male ratio in AF cases due to rheumatic heart disease as 2:3. In the Framingham study William B Kannel et al, 2325 men and 2826 women were followed biennially over 22 years for the development of atrial fibrillation. The incidence of AF did not differ significantly between sexes. Dante E Manyari et al in their study on 86 patients with AF, reported that 49 were female and 37 were male. Gurpal Singh et al (10) in their study of 64 patients in AF found the sex distribution to 29 males vs 35 females. In Indian studies, prevalence of AF is more in females because majority of AF patients are due to RHD, which is more common in females.

CV Risk Factors:

The risk factors which could have contributed to the development of AF as reported by Douglas P Zipes like smoking, alcohol consumption was also found in our study. History of smoking was present in 15% cases. Steward PM and Catterall JR in a case report suggested the relation between consumption of large doses of nicotine chewing gum for a long period and onset of atrial fibrillation in 35 years. But William et al reported that cigarette smoking was neither a constant nor a striking precursor of AF by itself. History of alcohol consumption was present in 9% of our cases

An association between alcohol use and AF has long been suspected and the relation between alcohol and binge - drinking (Holiday heart syndrome) is well known. Ettinger PO et al, Stewen R Lowenstein et al reported a strong relation between alcohol intoxication and this arrhythmia. Alcohol intoxication contributed to AF in 35% of patients after reviewing the records of 40 consecutive patients admitted to intensive coronary care unit with a diagnosis of new onset AF. In our study one case of AF was labeled as having Holiday Heart Syndrome.

Clinical Symptoms:

In our study of 100 cases of AF, 72% had history of palpitations followed by dyspnea in 66% cases, chest pain was seen in 35% cases, followed by fatigue in 28%, syncope was seen in 6% cases and one patient presented with stroke. Chest pain could be due to ischemic heart disease or relative ischemia due to left ventricular hypertrophy or due to the increased ventricular rate or right ventricular hypertrophy. The symptoms observed by Gurpal Singh et al (10) was similar. The incidence of dyspnea (46.8%) and palpitations (44.7%) was almost similar according to the ALFA study. In the study done by Rao et al, dyspnea (83.67%), palpitations (53.06%) and chest pain (30.61%) were the most common presentations. In Lok NS, Lau CP study dyspnea and palpitation were the most common symptoms.

Etiology Of af:

In the present study RHD accounted for majority of cases of AF, i.e., 77% cases, ischemic heart disease with hypertension was found in 11% cases, hypertensive heart diseases was found in 7% cases, ischemic heart disease alone was detected in 4% of cases, Atrial septal defect in 1

case, dilated cardiomyopathy in 2 cases, HCM in 1 case, COPD in 1% case. A similar hospital based study by Saroj K Prakash and Sudesh K Chugh (13) reported 91.61% of atrial fibrillation to be secondary to chronic rheumatic valvular heart disease, 5.94% due to coronary artery disease and the rest due to miscellaneous causes. Low incidence of thyrotoxicosis and hypertensive heart disease causing AF in the Indian study on female population is noteworthy. The Framingham study (11) identified rheumatic heart disease and cardiac failure as the most predictive precursor of AF. Hypertensive heart disease was the most common precursor, but the risk ratio for this disorder was not as great as for chronic RHD or cardiac failure.

An extensive retrospective study done by Davidson et al on 704 consecutive cases of AF reported, atherosclerotic cardiovascular disease (55%) including diagnosed cases of myocardial infarction, hypertensive heart disease and CAD as the most frequent cause associated with this arrhythmia.

In the present study, COPD accounted for 1 case. Study done by Davidson et al reported 2.8% cases with COPD. In the present study atrial septal defect was observed in 1 case, it was the only congenital heart disease observed as etiology in this study. Atrial septal defect is the most common congenital heart disease to cause AF in adults according to Levy et al.

Valvular Lesions In Rhd:

In our study, among the 77 cases of RHD presenting with AF, the most common lesion was isolated MS seen in 32(41.5%) patients, followed by isolated MR in 12(15.5%) cases & combined MS and MR in 10(12.2%) cases. The other lesions seen were MR with AR seen in 18(23.3%) cases, MS with MR with AR in 4 (5.3%) cases & organic tricuspid valve disease seen in 1 case.

In Gambhir et al, among RHD patients MS was the commonest cause of AF. Hurst et al and Gambhir et al have reported MS in 23.90% & 49.35% of their studies respectively. Isolated MR was found in fewer patients than MS. It was found in 17.40% & 2.36% of patients in Hurst & Gambhir et al respectively.

In a study done by Amit Palange & Mulay, Mitral valve involvement was observed in 57 cases (53.26%) and aortic valve in 1 case (0.93%). Isolated MS was observed 30(28.04%) cases, MS with MR in 24(22.42%) cases and isolated MR in 3 cases (2.8%).

In Trivedi et al, of the 34 cases of RHD presenting with AF, the most common valvular lesion was mitral stenosis in 20(58.8%) cases, 1(2.9%) case of mitral regurgitation, 6(17.6%) cases with both mitral stenosis and mitral regurgitation, 3(6%) cases with mitral stenosis, regurgitation and aortic valve involvement, 3(6%) cases with mitral stenosis, regurgitation and tricuspid valve involvement, 1(2%) case with mitral stenosis, regurgitation and involvement of both tricuspid and aortic valves.

Heart Failure:

In our study, 41 cases presented with congestive cardiac failure. In RHD group 32(41.6%) cases presented with heart failure and in non RHD cases 9(39.1%) cases presented with HF. In rheumatic valvular severe MS there will be significant hemodynamic abnormalities, atrial fibrillation decreases ventricular filling both through loss of the atrial booster pump and through reduction of filling time when the ventricular response is rapid. In a study done by Gambhir, Cardiac failure was found in 64% of patients with AF. In a study done by Patel et al, out of 100 patients of AF, 30 patients (30%) showed evidence of congestive heart failure. In a study done by Trivedi et al, of the 50 patients of atrial fibrillation, congestive cardiac failure was seen in 33 (66%) cases, cerebrovascular accident alone in 4 (8%) cases,

Echocardiography:

The mean left atrial size of 100 cases of atrial fibrillation was 4.20 ± 0.38 cm. The smallest measuring 3.6cm and the largest 5.5cm. Most cases (39%) had left atrial size measuring 4.6-5.0cm, followed closely by mild LA enlargement between 4.1-4.6cm, seen in 36% of cases.

The mean left atrial size of cases of rheumatic etiology was 4.89 ±.2872cm and that of other causes of atrial fibrillation was 4.55±.1125cm.

In a study done by MP Gautam et al, of the 136 patients studied, about

78(57.35%) cases had left atrial size more than 4cm and the remaining 58(42.65%) cases had left atrial size less than 4cm.

In a study by Nanda et al, 62.1% had their left atrial size more than 3.5 cm and valvular heart disease; particularly mitral stenosis (47%) and dilated cardiomyopathy (90.09%) were the main causes of enlarged left atrium.

Kumar and Soodan in their study reported that, the maximum number of patients i.e. 35% had LA dimension between 4.1 -5.0 cm2, LA dimension less than 4.0 cm2 was seen in 32% of patients and LA dimension more than 5.0 cm2 was seen in 33% of patients and mean LA size was 4.72cm2.

Mean LA size in a study done by Bhardwaj R was 47.80±12.25mm. Mean LA size was higher in RHD patients 53.01±11.54 mm. 31 patients (22.6%) had LA size less than 40 mm. Several studies have shown a strong correlation between LA size and new onset AF.

A study done by Palle Petersen et al aimed at correlating duration of atrial fibrillation with left atrial size. It showed that in cases with atrial fibrillation of short duration the mean left atrial size had increased significantly and also in cases with atrial fibrillation of long duration it showed significant increases in left atrial size.

SUMMARY & CONCLUSION

All 100 cases of AF were studied in detail with regards to history, and thorough clinical examination was done. All patients were subjected to twelve lead ECG, Chest X ray, Echocardiography and other relevant investigations.

Out of 100 cases studied, the patient's age varied from 19 to 85 years with a mean age of 44 years. The maximum number of cases was seen in age group 21-40 years (63%). In this study females out-numbered males. Out of 100 total patients 68 were females and 32 were males. Palpitations were the most common symptom seen in 72% cases followed by breathlessness in 66% cases. RHD was the most common cause of AF in our study; hypertensive heart disease was the second most common cause for AF. In our study the number of patients with RHD was 77 and the remaining 23 cases had Non RHD etiological factors. The most common valve involved was the mitral valve in almost 99% cases of RHD, mitral stenosis being the most common lesion. Congestive cardiac failure was the commonest complication observed in 41% cases. Three patients with severe MS presented with LA clot.

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