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A study of atrial fibrillation with reference to clinical presentations and aetiologies

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ABSTRACT

Atrial fibrillation occurs in the normal heart and in the presence of organic heart disease of any cause. Various aetiologies are associated with AF. **Aim**: Present study is conducted to know clinical presentations of atrial fibrillation, aetiologies and relation between atrial fibrillation and left atrial size. **Methodology**: Study done for a period of one year on 50 cases of diagnosed AF are included in study. **Results**: Majority of cases (68.0%) of AF were between ages 26 – 55 yrs and were predominantly females (70.5%). Dyspnea (84%) and palpitations (76%) were most common clinical presentations. Majority (62.0%) of cases of atrial fibrillation were due to chronic rheumatic heart disease. Valvular lesion in CRHD that was most commonly associated with atrial fibrillation was combined lesion of mitral stenosis, mitral regurgitation and tricuspid stenosis (41.9%). 55% of mitral stenosis patients with AF had mitral valve area(MVA) of <1 sq.cm i.e., severe M S .Majority of atrial fibrillation cases (54%) had left atrial size of 4 to5 cms. **Conclusion**: Atrill fibrillation is predominantly seen in females of age group 26-55yrs while most common clinical presentation is dyspnea. Chronic rheumatic heart disease is underlying cause seen in most of the cases. AF associated Left atrial size enlargement is between 4 to 5 cms in majority of cases.

Key words: Atrial fibrillation, Aetiology, Clinical presentation.

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. AF is associated with high mortality and morbidity including stroke irrespective of aetiology. The overall prevalence of AF is 1 percent[1]. The prevalence of AF ranged from 0.1 percent among adults less than 55 years of age to 9 percent in those ≥80 years of age. It was estimated that 2.3 million adults in the United States currently have AF, and that this will increase to 5.6 million by the year 2050, with more than 50 percent being more than 80 years of age. Prevalence of AF increases with age and is slightly more common in men than in women[1].

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Atrial fibrillation is often associated with heart disease but a significant proportion of patients (about 30%) have no detectable heart disease[2]. Atrial fibrillation commonly occurs with rheumatic heart disease, particularly mitral stenosis. It also occurs with many other cardiac disorders, including coronary artery disease, congestive or hypertrophic cardiomyopathy, mitral valve prolapse, and mitral valve annular calcification. In the setting of acute myocardial infarction or following cardiac surgery, AF is a common but usually self-limited problem[3]. Fibrillation leading to thrombus formation is common, so its prevention appears to be a worthwhile therapeutic goal in itself. Therefore, demonstration that atrial fibrillation can lead to or perpetuate atrial enlargement may justify a more aggressive clinical approach. Atrial fibrillation is a major cause of embolic events which in 75% of cases are complicated by cerebrovascular accidents[4,5,6].

A number of potentially reversible, non cardiac factors are also associated with transient AF. The latter include hyperthyroidism, acute alcohol intoxication, cholinergic drugs, non cardiac surgery or diagnostic procedures, and pulmonary conditions leading to

hypoxemia[7,8]. In local population, present study is conducted to know clinical presentations of atrial fibrillation, aetiologies and relation between atrial fibrillation and left atrial size.

Methodology

It is a retrospective study done in patients attending out patient department of General medicine, from Oct 2010 to Sep 2011.The study group consists of 50 cases of atrial fibrillation.

A careful history from the patient was taken. Complete physical and systemic examination was done. Predetermined method of diagnosis was followed which includes the history of present illness and past illness and the patients are examined with special reference to cardiovascular system. Other systems are also examined to obtain complete back ground of the case. A set of Investigations were done to detect underlying cause and to know the left atrial size. All the findings were documented in a proforma. A written consent was taken from all patients. Institutional ethical committee approval was taken before study

Inclusion criteria: The patients included in this study were cases of atrial fibrillation electro cardiographically confirmed.

Exclusion criteria: Cases of irregularly irregular pulse caused by other arrhythmias were excluded from the study.

All other investigations such as complete blood picture, complete urine examination, erythrocyte sedimentation rate, urea, serum creatinine, sodium, potassium, electrocardiogram, 2D echocardiogram, chest X- ray were performed routinely. Also special investigations were done if required such as T_3, T_4, TSH, CPK-MB and CT-brain.

Results

Table- 1: Age and Sex Distribution in study

Age Groups(Yrs)	No of Cases (%) (N=50)	Males (%) (N=21)	Females (%) (N=29)
15-25	1(2.0)	0(0.0)	1(100.0)
26-35	9(18.0)	3(33.3)	6(66.7)
36-45	14(28.0)	3(21.4)	11(78.6)
46-55	11(22.0)	4(36.3)	7(63.7)
56-65	9(18.0)	6(66.7)	3(33.3)
66-75	4(8.0)	3(75.0)	1(25.0)
>76	2(4.0)	2(100.0)	0(0.0)

- 58% are females and the rest 42% are males. (M: F= 1; 1.3).
- In present study, majority of cases (68.0%) are between ages 26 – 55 yrs.
- Among cases in the age group 26 – 55yrs, females are predominant. (70.5%)
- In cases more than 56yrs, majority are males (73.3%).

Table-2: Clinical Presentations of atrial fibrillation

Clinical Presentations	No. of Patients (%)
Dyspnea	42(84.0)
Palpitations	38(76.0)
Pedal Edema	20(40.0)
Chest Pain	15(30.0)
Fatigue	14(27.0)
Haemoptysis	7(14.00
Stroke	3(6.0)
Syncope	-
Asymptomatic	1(2.0)

- In the present study dyspnea (84%) and palpitations (76%) are most common clinical presentations.
- Three cases have presented with stroke (6%).
- One patient was found to be asymptomatic (2%).

Table-3: Aetiology in Males and Female

Aetiology	No. of Cases	Males (%) (N=21)	Females (N=29)
CRHD	31	8(25.8)	23(74.2)
HTN	9	7(77.7)	2(22.3)
CAD	4	3(75.0)	1(25.0)
CCF	3	1(33.3)	2(66.6)
Hyperthyroidism	1	0(0.0)	1(100.0)
Alcohol	1	1(100.0)	0(0.0)
COPD	1	1(100.0)	0(0.0)
Lone AF	0	-	-

- In present study majority of CRHD patients with AF are females (74.2%)
-Males are predominant in Hypertension (77.7%), Coronary artery diseases (75%), Alcohol (100%) and COPD (100%). 100% of hyperthyroid patients with AF are females.

Table -4: Age Distribution of Aetiology in Females

Age Groups (yrs)	CRHD (%) (n=23)	HTN (%) (n=2)	CAD (%) (n=1)	CCF (%) (n=2)	Hyperthyroidism (%) (n=1)	Alcohol (N=0)	COPD (n=0)
15-25 (n=1)	1 (100.0)	-	-	-	-	-	-
26-35 (n=6)	6 (100.0)	-	-	-	-	-	-
36-45 (n=11)	10 (90.9)	-	-	-	1 (9.1)	-	-
46-55 (n=7)	6 (85.71)	1 (14.29)	-	-	-	-	-
56-65 (n=3)	-	1 (33.4)	-	2 (66.6)	-	-	-
66-75 (n=1)	-	-	1 (100.0)	-	-	-	-
>76 (n=0)	-	-	-	-	-	-	-

- In females AF was common (62%) in young to middle age group (15–45 yrs)
- Present study shows that CRHD is the most common (73.9%) cause of AF in females of young to middle age group (15-45yrs).
- In females of age more than 55yrs common causes of AF are HTN, CAD, and CCF.

Table -5: Age distribution of aetiology in males

Age Groups (Yrs)	CRHD (%) (n=8)	HTN (%) (n=7)	CAD (%) (n=3)	CCF (%) (n=1)	Hyperthyroidism (n=0)	Alcohol (%) (n=1)	COPD (%) (n=1)
15-25 (n=0)	-	-	-	-	-	-	-
26-35 (n=3)	3 (100.0)	-	-	-	-	-	-
36-45 (n=3)	2 (66.6)	-	-	-	-	1 (33.4)	-
46-55 (n=4)	3 (75.0)	1 (25.0)	-	-	-	-	-
56-65 (n=6)	-	4 (66.6)	1 (16.6)	-	-	-	1 (16.6)
66-75 (n=3)	-	2 (66.6)	1 (33.4)	-	-	-	-
>76 (n=2)	-	-	1 (50.0)	1 (50.0)	-		-

-Present study shows that majority of cases of AF due to CRHD occurred in young to middle age group(15-45).Other causes of AF in the same age group are alcohol induced AF and COPD.
- HTN, CAD, CCF are common (52.3%) in patients in age more than 55 yrs.

Table-6: Valvular lesions in CRHD

Valvular Lesion	No of Patients (%)
Mitral stenosis(MS)	4(12.9)
Mitral Regurgitation(MR)	2(6.45)
MS + MR	7(22.58)
MS+MR+ Tricuspid Regurgitation	13(41.9)
MS + MR + Aortic Regurgitation(AR)	3(9.6)
MS + MR + Aortic Stenosis(AS)	2(6.45)
Isolated AR	0
Isolated AS	0

- Valvular lesion in CRHD that is most commonly associated with atrial fibrillation is combined lesion of mitral stenosis, mitral regurgitation and tricuspid stenosis (41.9%).
- Combined lesion of MS and MR was common in 22.58%.
- Isolated MS and MR lesions form 15% and 6% respectively.

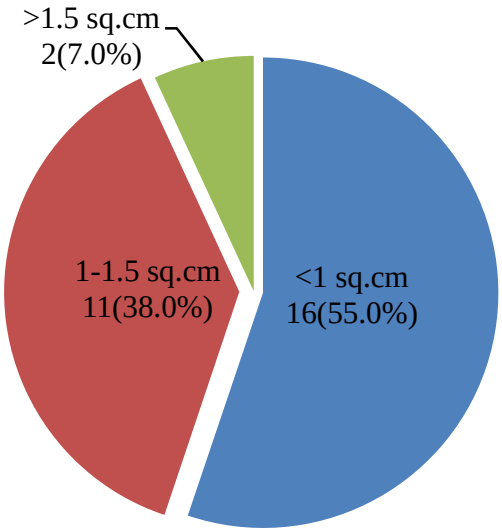

Figure -1: Mitral Valve Area (MVA) in CRHD associated with Mitral Stenosis

- In the present study 55% of mitral stenosis patients with AF have mitral valve area (MVA) of <1 sq.cm i.e., severe M S.
- 38% of cases have MVA of 1-1.5 sq.cm i.e., moderate M S.
- In only 7% of cases MVA was more than 1.5sq.cm i.e., mild MS.

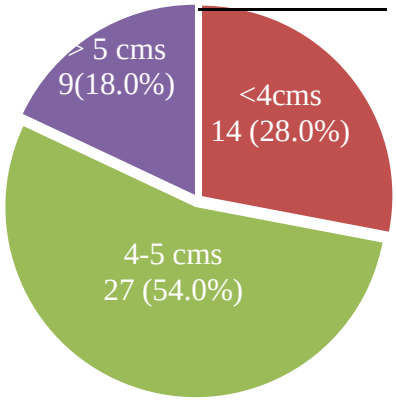

Figure -2: Left atrial size in atrial fibrillation cases

- Majority of atrial fibrillation cases (54%) have left atrial size of 4 to 5 cms.
- 28% of cases have left atrial size of less than 4cms.
- Only 18% of cases have left atrial size of more than 5 cms.

Discussion

In this study, atrial fibrillation was found more in females (58%) (Table-1). In the AnTicoagulation and Risk Factors In Atrial Fibrillation (ATRIA) Study, a cross-sectional study of almost 1.9 million subjects in a health maintenance organization in the United States, the prevalence was higher in men than women (1.1 versus 0.8 percent), a difference seen in every age group. Similar patterns were reported in a European population-based prospective cohort study of 6808 subject's ≥55 years of age. The prevalence was higher in men than women (6.0 versus 5.1 percent)[1,3].

Table-7: Comparison of sex distribution results in present study with previous studies

Sex	Present Study (%)	ATRIA study (%)[3]	J N Berry *et al* (%)[4]
Males	42.0	56.6	40.75
Females	58.0	43.4	59.25

This variation is because of etiological differences between study population and in western world. In western population, hypertension and coronary artery diseases as causes of AF are more prevalent than rheumatic heart disease and they are more common in males than females. In a study by J. N. Berry et.al, Rheumatic heart disease in our country is more prevalent in females (1.88 per thousand) than males (1.06 per thousand) and Rheumatic heart disease is the most common cause of AF in our country[4]. In present study 68% of AF cases are young to middle aged people, while in western population majority of AF patients are older people (Table-1).

Table-8: Comparison of age distribution results of present study with previous studies

Age Group(Yrs)	Present Study (%)	ATRIA study(%)[3]	J N Berry *et al*(%)[4]
<55	70	10	77
55-64	18	13.6	14
65-74	8	31.9	6
>75	4	44.6	3

Age distribution results of the present study are comparable with JN Berry *et* al[4], but it is differing with ATRIA Study[3].This variation is due to etiological differences between the study population and ATRIA study group. According to the study by J. N. Berry et.al [4], chronic Rheumatic heart disease in our country is more prevalent in young to middle age group (66%) and it is the most common cause of AF. While in ATRIA study, most common causes of AF are hypertension and coronary artery disease and these are commonly seen in older people(>55yrs). In the present study most common clinical presentations of atrial fibrillation are dyspnoea (84%) and palpitations (76%) (Table-2).

Table-9: Comparison of present study results with previous studies

Clinical Presentations	Present Study (%)	Le´vy *et al*(%)[9]
Dyspnea	84.0	44.4
Palpitations	76.0	54.1
Chest Pain	30.0	10.1
Fatigue	27.0	14.3
Paralysis	6.0	-
Asymptomatic	2.0	11.4

The various clinical presentations of AF in the present study are more prevalent when compared with the ALFA (Etude en Activite´ Libe´rale dela Fibrillation Auriculaire) study[9] by Le´vy *et al*. The main reasons for this variation are: patients in present study presented late after developing complications and most common cause of AF in present study is CRHD and these patients develop more complications with AF and therefore are more symptomatic. In the present study most common cause of AF is chronic rheumatic heart disease (62%). Hypertensive heart disease forms 18% of cases which is the second most common cause.

Table-10: Comparison of aetiological prevalence of present study with previous studies

Aetiology	Present Study (%)	ATRIA study (%)[3]	Raman T K *et al* (%)[10]
CRHD	62	4.9	58
Hypertension	18	49.3	3
Coronary Artery Disease	8	34.6	33
Congestive Cardiac Failure	6	29.2	-
Others	4	-	6

The present study results regarding aetiology of AF are different from ATRIA[3] study because there is high prevalence of Rheumatic fever and Rheumatic heart disease in India. It is associated with a high prevalence of AF and hence the most common cause of AF is Rheumatic heart disease. According to Kalman *et al*[11], in recent years, there has been a decline in the frequency of both RHD and the resultant AF in western countries. Currently, the most common underlying abnormalities associated with chronic AF are hypertensive heart disease and congestive heart failure.

In present study, majority of CRHD patients with AF are females(74.2%), while males are 25.6%.(Table-3)J N Berry study [4] found that the prevalence of rheumatic heart disease and rheumatic fever is almost equal in males and females below the age of I5 but it rises in women in the child-bearing age of I5 to 40 years, indicating even in the absence of a longitudinal study for incidence of new cases, that probably fresh attacks of rheumatic fever continue to occur and cause rheumatic heart disease in women in adult life, probably because of the accelerating influence of pregnancy and the prevalence of rheumatic heart disease is 60.4% in females and 39.4% in males. The above findings are further supported by Le´vy *et al* [9] (ALFA Study) and they found that rheumatic valvular disease as a cause of AF is more prevalent in women (25.0%) but not in men (8.0%).

Hypertension (80%), Coronary artery diseases (75%) are predominant in males. Present study shows that in females with AF, CRHD is more common (73.8%) in young to middle age group (15-45yrs) (Table-4). In J N Berry *et al* study [4], RHD which is associated with high prevalence of AF, is most common (62.8%) in young to middle age group. In females of age more than 55yrs common causes of AF are HTN, CAD, and CCF.

In males 71.4% of AF cases are more than 45yrs (Table-5). Present study shows that majority of cases of AF due to CRHD occurred in young to middle age group (15-45yrs) (Table-6).Other causes of AF in the same age group are alcohol induced AF and COPD. HTN, CAD, CCF are common (52.3%) in patients in age more than 55 yrs.

In the present study, valvular lesion that is most commonly associated with atrial fibrillation is combined lesion of mitral stenosis, mitral regurgitation and tricuspid stenosis (44%) (Table-6).Next common is combined lesion of MS and MR (20%) Isolated MS and MR lesions form 15% and 6% respectively. Rheumatic heart disease is associated with a high prevalence of AF (78%). Study by Diker E *et al*[12] evaluated the frequency of AF in approximately 1100 patients with rheumatic heart disease. The prevalence varied with the type of valve disease.

Table-11: Comparison of prevalence of valvular lesion in present study with previous study

Valvular Lesion	Present Study (%)	Diker et.al (%)[12]
Mitral Stenosis(MS)	15.0	16.0
Mitral Regurgitation(MR)	6.0	2.7
MS + MR	20.0	32.7
MS+MR+ Tricuspid Regurgitation	44.0	23.32
Aortic Stenosis	0	<1.0

The variation between the present study and Diker *et al* is due to the fact that many patients in this study reported late after developing biventricular failure and also the combined lesion of MS+MR+TR

independently is associated with high rate AF (70%)[6]. In contrast, AF was present in only about 1 percent of patients with aortic stenosis who did not have heart failure. This is not surprising since AF is usually a late feature in aortic stenosis. In the present study 53% of mitral stenosis patients with AF have mitral valve area (MVA) of <1 sq.cm i.e., severe MS. 40% of cases have MVA of 1-1.5 sq.cm (Figure-1). In only 6% of cases MVA is more than 1.5sq.cm i.e., mild MS.

Table-12: Comparison of mitral valve area results of present study with previous studies

Mitral Valve Area	Present Study (%)	Peter Probst *et al* (%)[13]
<1 sq.cm	55.17	62.0
1-1.5 sq.cm	37.93	24.0
>1.5 sq.cm	6.89	14.0

Present study results are comparable to Peter probst *et al* study[13].Contrary to earlier belief, Fraser and Turner concluded from a study of 269 patients with mitral valve disease that atrial fibrillation bears no direct relationship to severity of mitral disease. In the present study, majority of atria fibrillation cases (54%) have left atria size of 4 to 5 cms. 28% of cases have left atria size of less than 4cms. Only 18% of cases have left atria size of more than 5 cms.

Table-13: Prevalence of various LA sizes in present study in comparison with previous studies

LA size	Present Study (%)	Peter Probst *et al* (%)[13]
<4 cm	28.0	36.0
>4 cm	72.0	64.0

Findings in present study are similar to that of Peter probst *et al*[13]. The normal left atrial dimension in adults is less than 4.0 cm (or <2.0 cm/m2 body surface area). Left atrial enlargement is common in AF, particularly in patients with mitral valve disease, left ventricular dilation, annular calcification, or hypertension. In addition, sustained AF itself can lead to a further increase in left atrial size, an effect that is reversible after cardioversion and maintenance of sinus rhythm. Regardless of the mechanism, left atrial enlargement is important prognostically. Compared to a normal left atrial diameter of less than 4.0 cm, the relative risk of recurrent AF was 1.6 with a left atrial diameter between 4.1 and 5.0 cm and 4.5 above 5.0 cm (Figure-2).

As neither atrial fibrillation nor marked atrial enlargement can consistently be related to the severity of mitral stenosis as determined by valve area size or to any other measurable hemodynamic variable affected by mitral valve obstruction, the question of whether left atrial enlargement is the cause or the effect of the arrhythmia remains unresolved.

Conclusion

Majority of cases (68.0%) of AF were between ages 26 – 55 yrs. Among cases in the age group 26 – 55yrs, females were predominant (70.5%). Dyspnea (84%) and palpitations (76%) were most common clinical presentations and three cases had presented with stroke (6%). Majority (62.0%) of cases of atrial fibrillation were due to chronic rheumatic heart disease and other causes of AF were Hypertension (18%), CAD (8%) and Heart failure (6%). Majority of CRHD patients with AF were females (74.2%) while males were predominant with Hypertension (77.7%), Coronary artery diseases (75%). Valvular lesion in CRHD that was most commonly associated with atrial fibrillation was combined lesion of mitral stenosis, mitral regurgitation and tricuspid stenosis (41.9%). Also 55% of mitral stenosis patients with AF had mitral valve area(MVA) of <1 sq.cm i.e., severe M S and 38% of cases had MVA of 1-1.5 sq.cm i.e., moderate M S. Majority of atrial fibrillation cases (54%) had left atrial size of 4 to 5 cms and only 18% of cases had left atrial size of more than 5 cms.

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