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A Clinical Study of Atrial Fibrillation and Importance of Echocardiography

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Abstract
Atrial fibrillation (AF) is one of the commonest sustained cardiac arrhythmia characterized by presence of multiple, interacting reentry circuits looping around the atria. The aim of the study is to detect the various etiology of AF and to know various clinical presentations in AF and also to find out the relationship between AF and left atrial size based on echocardiography. A prospective observational cohort study was carried out with a total of 100 subjects presented to medical and ICUs of RIMS-kadapa between august 2017- august 2018. Dyspnoea (88%) was the commonest symptom. In this study L.A. Size ranges from 3 cm to 7.8 cm. Most of the cases the L.A. commonly associated with MR. Our study concludes that in this area of region females are more prone to AF. The group suffering with AF is from 21-50 yrs.RHD is the common cause of AF in young age where as HTN&IHD is common in old age. Common complication observed is CCF.AF is commonly seen in patients with left atrial size > 4 cm (74%) on echocardiogram.
Keywords: *Atrial fibrillation, Rheumatic heart disease, Mitral regurgitation, Ischemic heart disease, echocardiography.*

Introduction

Atrial Fibrillation is one of the commonest sustained cardiac arrhythmia which a physician comes across during his course of study and medical practice. It is characterized by the presence of multiple, interacting reentry circuits looping around the atria. It is found in association with various types of diseases, cardiac as well as extra cardiac and sometimes as "lone phenomenon". It is responsible for many complications like heart failure, embolic phenomenon, and pulmonary oedema[1]. Echocardiography plays a critical role in defining the clinical context of the arrhythmia and guiding management.[2] Echocardiography continues to be the foundation of clinical evaluation and management of atrial fibrillation.[3]overall prevalence is 5% in adult population, the

prevalence raises with age affecting 2.5% of 70 years old and 9% of those aged over 80 years[2].As the population ages globally, atrial fibrillation (AF) is predicted to affect 6–12 million people in the USA by 2050 and 17.9 million in Europe by 2060.[4,5]

ACC/AHA/ESC Classification:[6]

1. Paroxysmal AF (Self-terminating) generally lasts<7 d (usually<24h) and may be recurrent.
2. Persistent AF (fails to self-terminate) lasts for>7d, may also be Paroxysmal if it recurs after reversion (recurrent if>2 episodes)
3. Permanent AF lasts for more than 1 y and cardioversion has not been attempted or has failed.
4. "Lone" AF describes paroxysmal, persistent, or permanent AF in individuals without structural heart disease.
*Classification applies to episodes of AF lasting > 30 seconds and are unrelated to reversible cause.

The investigations that are done for AF are electrocardiography, skiagram of chest, echocardiography**.**

Echocardiography

The term echocardiography refers to a group of tests that utilize ultra sound to examine the heart and record information in the form of echoes ie., reflected sound waves.

Indications for echocardiography

- Assessment of cardiac structure and function
- Assessment of aetiology of AF
- Assessment of thromboembolic risk or the aetiology of peripheral embolism.[7,8]

Materials and Methods

Study Design: Prospective observational cohort study

Study Sample: 100 cases of atrial fibrillation

Study Period: August 2017-August 2018

Study Site: Rajiv Gandhi Institute of Medical Sciences, A tertiary care teaching hospital, Kadapa

Data Collection: All cases were examined in detail as per proforma with special reference to cardiovascular system. Other systems were also examined in detail, whenever it was found necessary. In each case, history of present and past illness was carefully inquired into so as to obtain a complete historical background of case. Investigations like urine examination, complete Blood picture, Erythrocytes sedimentation rate, Blood urea, Serum creatinine, Blood sugar, serum electrolytes and chest radio graph examination have been carried out. Special investigations like electrocardiogram, echocardi-ogram, transesophageal echocardiogram also done. Whenever necessary blood for culture and sensitivity, CT Brain in case of stroke.

The electrocardiogram was studied for rate and 'f' wave pattern. The echocardiogram was studied to assess the valvular lesions, MVA in mitral stenosis cases, and enlargement of chambers particularly the left atrium size. TEE was done to detect any thrombi or bacterial vegetation in the cardiac chambers or on valves. For few patients trans esophageal echocardiogram not done because of patient ill health,, sometimes patient unwillingness.

Results

During the study period a total of 100 Patients were admitted in the wards of medical and ICUs of RIMS General Hospital, Kadapa district. Out of these 60 were females and 40 were males and their age ranging from 13 years to 80 years. Atrial fibrillation was seen more in the patients of age group ranging 21-50 years.

Table 1- Age wise distribution

Age Group	Male	Female	Total	Percentage
11-20	4	4	8	8
21-30	12	12	24	24
31-40	12	18	30	30
41-50	6	16	22	22
51-60	2	4	6	6
61-70	4	4	8	8
71-80	-	2	2	2

Clinical Presentations

In this study the main clinical presentations were dyspnea (88%) and remaining were as follows palpitations (80%), pedal edema (52%), chest pain (38%), haemoptosis (12%), paralysis (14%) and syncope1%.The duration of symptoms ranged

from 15 days to 20 years. Shorter duration in cases of ischaemic Heart Diseases, Hypertensive Heart Diseases, thyrotoxicosis, cardiomyopathy, lone artial fibrillation & longer duration in rheumatic Heart Disease.

Aetiological Incidence

Among 100 collected cases an attempt has been made to establish the etiology by history, clinical examination, ECG, CXR, 2D-Echo cardiogram. Their incidence has been analyzed and also Female preponderance is seen in rheumatic and hypertensive heart disease etiology and male preponderance is seen in IHD as showed in table 2. In this study RHD (74%) is most common cause, followed by IHD (8%), HTN (6%), thyrotoxicosis (4%), HOCM 2%.

Table 2: Aetiological Incidence

S.No	Disease	Total	Male	Female
1	RHD	74	26	48
2	IHD	8	6	2
3	HTN	6	-	6
4	Thyrotoxicosis	4	2	2
5	HOCM	2	2	-
6	Constrictive pericarditis	2	-	2
7	Lone AF	2	2	-
8	Marfan's synd.	2	2	-

HOCM=Hypertrophic obstructive cardiomyopathy

Distribution of Patients Based on Valvular Lesions

The common cause of AF is RHD. Out 74cases of rheumatic heart disease MS cases are most common.Only MS cases are 9(24.3%), only MR, 3(8.1%) cases other common Valvular lesions are MS+MR, MS+MR+AR.

Table No: 3. Distribution of Patients Based on Valvular Lesions

Value	No.of Patients	Pecentage
1. MS	18	24.3
2. MR	6	8.1
3.MS+MR	18	24.3
4. MS+MR+AR	18	24.3
5. MS+AR	6	8.1
6. MR+AR	4	5.4
7. MS+MR+AS	2	2.7
8. MR+AS+AR	2	2.7

AR = aortic regurgitation; AS = aortic stenosis; MR = mitral regurgitation; MS = mitral stenosis;

MVA in RHD Distribution Based on Associated With Ms

In this study ranges from 0.4 to 2.8 Sq.cms. Most of the cases MVA is<1 Sq. cms (Severe). Isolated MS have less MVA comparatively associated with other valvular lesion.

Table No:4 MVA in RHD associated with MS

MVA	No.of Patients	Percentage
Up to 1 sq.cms	30	48.4
1.1-2 sq	26	41.9
>2Sq.cms	6	9.6

MVA= Mitral Valve Area

Left atrial sizes

In the present study L.A. Size ranges from 3 cm to 7.8 cm. Most of the cases the L.A. commonly associated with Regurgitant valvular lesions (MR). The sizes of left atrium is shown in the table No. 5.

Table No 5- L.A sizes

L.A.Size	No.of Patients	Percentage
<4cms	26	26
4-5	56	56
>5cms	18	18

Clots in cardiac Chambers L.A/L.V

In this study out of 100 cases 14 cases (14) have clots.Out of those 14 cases 12 cases has rheumatic etiology & 6 cases L.A. clots, 4 cases L.A.A. clots 2 case have vegetation over AML/PML.Out of 14 cases is CAD have large soft clot in L.V 4 cases are presented with stroke, 4 cases with infective endocarditis.

Changes in ECG

1. Rate

In our study the rate range between 60 – 180 / minute. 50% of cases (50) showing rate 100-150 and 10% cases showing rate > 150 and remaining were showed ventricular rae<100. RHD cases showing tachycardia comparatively other causes.

2. ORS (in horizontal plane)

3. Ventricular hypertrophy

Normal – 21 – (42%)

RVH – 20 – (40%)

RAD – 28 – (56%)

LVH – 6 – (12%)

LAD – 1 – (2%)

- Most of the RHD showing RAD (right axis deviation)& RVH (right ventriclular hypertrophy)
- HTN & HOCM cases showing LVH.

Complications Showing in 100 Cases of AF

The common complication seen in this area of AF is CCF (60%) followed by other complications such as angina (32%), embolic stroke (16%) in which 4 patients are of TIA and haemoptysis (12%), infective carditis (4%). The incidence of stroke is also high (16%).

Discussion

Age and Sex Distribution

In present study atrial fibrillation was seen more in the patients age group below 50 years (21-50 years). According to Paulwood and Lip Gy, Golding DJ majority of people fibrillated after the age of 50 years.[9] This difference is because of etiological cause of A.F. In present study rheumatic etiology is common, but in their study HTN, IHD is common.

In present study the sex ratio of female to male 1.5 : 1, According to lok NS, Lan CP the ratio is 1.8 : 1. In both studies female preponderance is there.[10]

Clinical Presentation

In present study Dyspnea (88%), palpitations (80%) are most common presentation.Stroke in 14% of cases.The symptoms are longer duration in rheumatic aetiology and shorter duration in other causes.In lok NS, Lan CP study Dyspnea (38.1%) palpitation (42.3%) are the most common presentation.[11]

Etological Incidence

There is significant variation in the incidence of various cause between first five studies and last two studies. The RHD is the most common cause of persistent permanent AF in our country where as in west IHD & HTN is the commonest cause.

According to ICMR research report the national incidence of RHD is 6 per 1000 population. Hospital based studies from all over India show RHD ranging from 26.6 to 60 (average 40).[12]

Table No.6 Etiological incidence of chronic AF By Various Authors

Author	No.of Cases	RHD	IHD	HTN	Others
1. Kannel et al.(Framingham study) 1982	98	17%	10%	47	-
2. Hinton et al 1977	333	30%	51%	10	10
3. Hansberg	642	14.8	13.4	47.5	24.3
4. Lok NS, Lau CP	291	17.5	-	28.9	-
5. Lip Gy, Golding DJ	111	-	28.8	36.9	-
6. Raman TK (Madras)	100	58%	33%	3	6
7. Present Study	50	74	8	6	12

Valvular Affection in RHD with AF

In present study AF in RHD occurring 24.3% of patients with isolated MS, 8.1% of patients with isolates MR combination lesions are 24.3% MS + MR, 24.3% are MS + MR + AR, 8.1% are MS + AR and 5.4% are MR + AR.

In Diker E study 29% of patient with isolated MS and 16% of patients with isolated MR.[13]In our study combination of the lesions are common.

MVA in RHD Associated with MS

In present study MVA ranges from (0.4 to 2.8 sq.cm) Most of the cases of AF associated with MVA is less than 1 sq cm (severe). Isolated MS have less MVA as comparatively associated with other valvular lesions.

Left Atrial Size

In this study LA size ranges from 3 cm to 7.8 cm. In most of the cases the LA. Size between 4-5 cm (56%). Large LA commonly associated with regurgitations (MR).[14]

Clots in Cardiac Chambers

In this study out of 100 cases 14 cases (14) have clots. Out of those 14 cases 12 cases has rheumatic etiology & 6 cases L.A. clots, 4 cases L.A.A. clots 2 case have vegetation over AML/PML. Out of 14 cases is CAD have large soft clot in L.V 4 cases are presented with stroke, 4 cases with infective endocarditis.

ECG Changes

In this study most of the cases showing [(60%) tachycardia] ventricular rate > 100. 10% cases

showing ventricular rate> 150RHD cases showing high ventricular rate, comparatively other causes. Most of the RHD cases showed RAD and RVH.HTN & HOCM cases showing LVH.

Complications of A.F

In Framingham study group, the mortality by the end 20 years of follow up was 60% for men and 45% for women with average time discovery of AF to death of 6 years[12].

In this study, CCF (60%) is most frequent complication, followed by Angina (32%) and other, patients the etiology is rheumatic. In Lip GY, golding DJ study the common complications are CCF (30.6%) and stroke (18%)[10].

Conclusion

The following conclusions can be drawn after analyzing the results.

AF is more common in the age group of 21 – 50 years. AF is more common in females compared to males. Rheumatic heart disease is the commonest cause. AF due to HTN, IHD and other etiologies is common in old age.

Echocardiographyis having significant importance in studying the complete cardiogram of AF Patients and one can analyze the relation between atrial fibrillation and left atrial size based on echocardiography. Echocardiography is also useful to identify the etiology and complications.

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