



A STUDY OF LEFT ATRIAL AREA AND VOLUME ON ECHOCARDIOGRAPHY AMONG ATRIAL FIBRILLATION CASES WITH VARIOUS AETIOLOGY

General Medicine

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ABSTRACT

Background: Atrial fibrillation (AF) is the most common arrhythmia. It is associated with significant morbidity and mortality. The size and volume of left atrium is an important development of atrial fibrillation which land up subjects into various complications so present study was carried out to study echocardiography findings (size and volume) among AF Cases with various underlying aetiology.

Material and methods: A cross-sectional observational study was conducted for duration of 2 years to measure left atrial size and volume by echocardiography in patients of atrial fibrillation in various diseases. A proforma was designed to collect the desired information from the patients. The preformed structured proforma consisted of recording of investigations was used as data collection tool. All efforts were made to diagnose the aetiology of atrial fibrillation.

Results: A total of 50 cases of AF were studied with mean age of study participants 53.68 ± 12.74 yrs (range 25-80yrs) and F: M-1.3:1. Major risk factors found were RHD (44%) Hypertension (28%) IHD (24%) and DM (14%). Mean LA volume and size on echo measurement was 78.16ml and 28.88cm^2 . There was significant dilatation of LA among RHD with $p < 0.05$ among major risk factors found in study.

KEYWORDS

Echo-cardiography, Left atrium, Size, Volume

INTRODUCTION:

Atrial Fibrillation (AF) is the most common chronic arrhythmia, worldwide. It is estimated that it affects more than 2.3 million Americans, or 1% of the population and the prevalence is expected to increase by more than 2.5 fold by 2050. The lifetime risk of developing AF is 25% for men over 40 years of age.¹

According to current guidelines AF is defined as: standard ECG shows irregular RR intervals, i.e RR intervals do not follow a repetitive pattern. There are no distinct P waves on the ECG. Some apparently regular atrial electrical activity may be seen in some ECG leads, most often lead V1. The atrial cycle length (when visible), i.e., the interval between two atrial activations, is usually variable and >200 ms, corresponding to a heart rate of >300 atrial activations per minute.²

Atrial fibrillation can be caused by, or a cause of CHF, and their coexistence leads to a vicious cycle of decreased exercise capacity, worsening heart failure and increased morbidity and mortality.³

An analysis of the data from the Indian Heart Rhythm Society Atrial Fibrillation Study reveals that rheumatic heart disease is the most common cause of atrial fibrillation in India accounts for nearly 50% of cases. Atrial fibrillation account for 15% of all strokes and is the leading cause of embolic stroke.¹

The size and volume of left atrium is an important development of atrial fibrillation particularly in patients of rheumatic heart disease and also helps in cardio version. A number of diseases have been found to be associated with left atrial dysfunction. It is therefore essential to document echocardiographically left atrial size serially and offer surgical therapy in patients of rheumatic heart disease, when the left atrium size attains more than 4.0 cm.^{4,5}

Therefore, keeping in view of the urgent need and the lacunae in literature the present study was undertaken to study the left atrial size and volume in patients of atrial fibrillation in various diseases.

MATERIAL AND METHODS:

A cross-sectional observational study was conducted for duration of 2 years (October 2016-september 2018) to measure left atrial size and volume by echocardiography in patients of atrial fibrillation in various diseases. The study was conducted in the department of medicine of

Dr. D.Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune and is a numeration of patients of the department fulfilling the inclusion criteria. A total of 50 cases of AF during study duration admitted in medicine Department and fulfilling the inclusion criteria were enrolled in study.

Ethical clearance was obtained from Institutional Review Board and written informed consent for participation was obtained from the patients prior to conduction of study. The patients were informed regarding the purpose, procedures, risks and benefits of the study in their own vernacular language.

Inclusion criteria: 1. Patients of atrial fibrillation aged above 12 years irrespective of cause and willing to participate. 2. Patients who were intellectually and physically capable of responding and participating.

A proforma was designed to collect the desired information from the patients. The structured proforma consisted of recording of investigations such as Hemogram, ESR, BSL-Fasting, LFT, RFT, Serum Electrolytes, Lipid Profile, ECG, X-ray chest PA view, Echocardiography (M Mode), TFT, CT Brain and Trans Esophageal Echocardiography if indicated. All efforts were made to diagnose the aetiology of atrial fibrillation.

LA dilatation was considered when LA size was more than 20cm^2 on Echo-cardiography and LA volume was considered raised when LA Volume was more than 50ml on Echo-cardiography.

The data collected was entered in Microsoft Excel and subjected to statistical analysis using Statistical Package for Social Sciences (SPSS). The level of significance was fixed at 5% and $p \leq 0.05$ was considered statistically significant."

RESULTS:

A total of 50 cases of AF were studied with mean age of study participants 53.68 ± 12.74 yrs (range 25-80yrs) and F:M:1.3:1. Maximum cases were admitted with chief complains of breathlessness 78%, palpitation 76% and chest pain in 38%. Major risk factors found were RHD (44%) Hypertension (28%) IHD (24%) and DM (14%). Mean LA volume on echo measurement was 78.16ml and mean LA area on echo measurement was 28.88cm^2

There was significant dilatation of LA among RHD with $p < 0.05$ among major risk factors found in study

DISCUSSION:

Atrial Fibrillation is a manifestation of various illnesses the commonest being rheumatic valvular heart disease of the mitral valve. However it is also seen in COPD with Pulmonary Hypertension, Systemic Hypertension, Ischemic heart disease, Endocrine diseases like hyperthyroidism. Irrespective of cause, signs- symptoms and complications arising out of Atrial Fibrillation are similar and life-threatening and morbid. Hence this study was undertaken in an attempt to find reproducible parameters of association which may predict and warn of impending complications.

In this study, Left atrial area and volume of 50 patients of atrial fibrillation due to various causes was studied. Present study had patients in age range of 25yrs to 80 yrs. Maximum being above 60 yrs of age (34%) .Average age being 53.68 yrs. study had a female preponderance with 56% of study population.. In a study conducted by Ranvijay et al.,⁶ majority of patients were females and the highest number of patients with atrial fibrillation was seen in age group 61-70 years (26.37%) followed by 25.45 in age group 51-60 years. Another study conducted by Sastry et al.,⁷ also reported female predominance and majority of patients in the age group of 41-70 years. Jonas oldgren et al.⁸ in their study reported the average age of patients to be 65.9 years, ranging from 57.2 to 70.1 years.

Symptom wise our study reported palpitation in 76%, breathlessness in 78% whereas chest pain was seen in only 38% of the cases. Tejinder kumar⁹ reported Dyspnoea is the commonest symptom 74%, palpitations 57%, fatigue 19%, syncope 17% and chest pain 11% and 14% patients were asymptomatic.

In Our study hypertension was seen in 28%. Hypertension has been considered the most common risk factor for AF globally; prevalence is 41.6% in India and 80.7% in Eastern Europe.⁸ Hypertension was greater risk for AF in which 50% in men and 40% in women, had 4th rank after HF, aging, and valvular heart disease, according to the Framingham study.¹⁰

In a study conducted by Rannvijay et al.,⁶ hypertensive heart disease was reported in 12.73 % individuals.

In our study ,dyslipidemia was seen in small number of patients . Thus Total cholesterol were normal in 90%, triglycerides in 96% , HDL normal in 12% patients and LDL in 94% patients.

In a cohort study with follow up of 7.2yrs by Xintano Li et al.,¹¹ found that incidence of AF inversely associated with High level of Total Cholesterol and LDL-C levels, after multivariable adjustment also same with Total cholesterol and LDL-C levels. TG and HDL-C levels showed no significant association with newly developed AF. Both LDL-C/HDL-C and TC/HDL-C ratios were inversely associated with risk of AF.

Present study found causes for AF were RHD 44%,Hypertension 28%, Diabetes 14%, IHD24%, thyroid disorder 8%.A number of studies have taken into consideration with various etiological causes.A study conducted by Tejinder kumar reported⁹ Congestive cardiac failure in 67%. Most of patients had RHD 54% , CAD 9%, Hypertension (alone) 8% and Chronic Obstructive pulmonary Disease(8%), cardiomyopathy 7%, hyperthyroidism 3% and congenital heart disease 2%. Nine percent of the patients had the lone atrial fibrillation. Another study by Rannvijay et al.,⁶ who also studied the etiology of Atrial fibrillation reported Rheumatic heart disease as the commonest cause of atrial fibrillation seen in 66 (60%) of patients. Hypertensive heart disease in 13 patients (12.73%) and degenerative valvular heart disease in 12 patients (10.91%). Other causes in order of frequency were Ischaemic heart disease, Cor pulmonale, Thyrotoxicosis, Idiopathic dilated cardiomyopathy and constrictive pericarditis. Lone atrial fibrillation was seen in only one patient.

Small sample size couldnot reveal association between various etiological causes and LA area and volume findings on echocardiography but there were more number of cases with underlying causes and dilated LA size and raised LA volume.

Further study with large sample size will help to find causal association

between etiology and diated LA and raised volume of LA to generalise the study findings.

Table 1: Baseline study participants characteristics (n=50)

Age Group	Frequency	Percentage
20-29	2	4
30-39	6	12
40-49	12	24
50-59	13	26
60 and above	17	34
Gender		
Female	28	56
Male	22	44
Chief Complaints		
Palpitation	38	76
Breathlessness	39	78
Chest Pain	19	38
Heart Rate		
< 60	2	4
60-100	34	68
> 100	14	28

Table 2: Investigatory findings among study participants (n=50)

Hb	Frequency (%)
<11mg%	20 (40)
>11mg%	30 (60)
Chest-Xray	
Normal	40(80)
Cardiomegaly	3 (6)
COPD	7 (14)
Dyslipidaemia	5(10)
Echo LA Area-Dilated	41(82)
Echo LA volume-Raised	28(56)
Thyroid Dysfunction	4(8)

Hb-Haemoglobin, COPD-Chronic obstructive pulmonary disease, LA-Left atrium

Table 3: Echocardiography findings of Left atria with major risk factors in study participants

Major Risk factors	Echo-LA Area	
	Normal (%)	Dilated (%)
RHD(n=22)	4(18.2)	18(81.8)
Hypertension(n=14)	3(21.5)	11(78.5)
IHD(n=12)	2(16.7)	10(83.3)
Diabetes(n=7)	1(14.3)	6(85.7)
Neurodeficit(n=4)	1(25)	3(75)
Thyroid Dysfunction(n=4)	2(50)	2(50)
Major Risk factors	Echo-LA Volume	
	Normal (%)	Dilated (%)
RHD(n=22)	8(36.4)	14(63.6)
Hypertension(n=14)	5(35.8)	9(64.2)
IHD(n=12)	5(41.7)	7(58.3)
Diabetes(n=7)	4(57.1)	3(42.9)
Neurodeficit(n=4)	2(50)	2(50)
Thyroid Dysfunction(n=4)	1(25)	3(75)

RHD-Rheumatic heart disease

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