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ATRIAL FIBRILLATION

General Medicine

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ABSTRACT

Introduction: Atrial fibrillation (AF) is a common and increasingly frequent abnormal heart rhythm during which the upper chambers of the heart beat irregularly. This can result in an irregular and often fast heartbeat that may cause symptoms such as chest pain, shortness of breath, dizziness, weakness or fatigue. AF can be caused by a variety of factors, including underlying structural heart disease, and is associated with an increased risk of congestive heart failure and stroke. An ECG in AF typically shows a rapid irregular tachycardia with no recognizable P waves. The ventricular rate in untreated AF generally ranges from 150 to 220 beats/min, but may be slower in elderly patients.

Objective:

1. To Study age, sex distribution and etiologic analysis of atrial fibrillation
2. To study the symptom profile of atrial fibrillation
3. To assess left atrial size and relation of that to permanent atrial fibrillation
4. To assess the incidence of Left atrial clot in cases of atrial fibrillation by Transthoracic Echo

Materials And Methods:

This study was conducted at Kanyakumari Medical College & Hospital, Kanyakumari. This study was conducted during the period of 6 months Jun 2022- December 2022, 100 cases of atrial fibrillation were included in this study. The Diagnosis of Atrial Fibrillation: This is made on clinical grounds and then confirmed by electro cardiographic methods. **Results:** Atrial fibrillation (AF) is a common arrhythmia, present in 0.4% of the overall population, with higher incidence in countries with a high prevalence of rheumatic heart disease. In this study, 57% of the study population were male and 48% had rheumatic heart disease as the cause of AF. The second most common cause of AF was ischemic heart disease (27%). Hypertension was the cause in 8% of cases. The main complaint for most patients in the study population was shortness of breath (70%). Palpitations were present in only 11% of patients.

Conclusion:

1. Mean age of the study population was 41.8 years.
2. Atrial fibrillation seen more in males (57%) than females (43%)
3. Most common cause was RHD (48%) with mitral valve involvement.
4. Common presenting symptom was dyspnoea.
5. 25% of the patients with AF had significant haemodynamic instability requiring cardioversion.
6. CCF was the most common complication in 90% of patients.
7. Echo revealed LA dilatation in 87% of cases.
8. LA clots were present in 70% of pts with cerebral embolism.
9. Left atrial size more than 4cms (65%) of the cases was found to be related to permanent or persistent atrial fibrillation.

KEYWORDS

INTRODUCTION

Atrial fibrillation (AF) is the commonest cardiac arrhythmia, and is increasing in frequency. Atrial fibrillation is an abnormal heart rhythm during which the upper chambers of the heart beat irregularly. Normally the pacemaker of the heart generates an electrical impulse, which is conducted or carried to the lower or pumping chambers of the heart via the electrical conducting tissues of the heart. This allows a natural sequence of contraction where the upper chambers (atria) beat first, thus filling the lower chambers (ventricles). This sequence allows priming of the pumping chambers and contributes as much as 20% of the output of the heart. In atrial fibrillation, the heart's natural pacemaker, the sinus node, no longer generates an electrical impulse. Instead electrical activity occurs irregularly throughout both left and right atria. This irregular electrical impulse is conducted erratically to the ventricles, resulting in an irregular heartbeat which may be excessively fast and vary in volume from beat to beat. The atrial electrical activity is very rapid (approximately 400 to 700 beats/min), but each electrical impulse results in the depolarization of only a small islet of atrial myocardium rather than the whole atrium. As a result, there is no contraction of the atria as a whole. Since there is no uniform atrial depolarization, there is no P wave. The chaotic electrical activity produces deflection on the ECG, referred to as fibrillatory wave.

Fibrillatory waves vary in size and shape and are irregular in rhythm. Transmission of these multiple atrial impulses into the AV node is thought to occur at random, resulting in an irregular ventricular rhythm. Some impulses are conducted into, but not through, the AV node; i.e., they are blocked within the AV node. This is a form of "concealed conduction" and is important since such non- conducted impulses contribute to the overall refractoriness of the AV node. For this reason, the ventricular rate of atrial fibrillation is often slower (averaging 160 to 180 beats/min)

Today, more than 5% of those over 65 have AF. And most of these cases have underlying structural heart disease, which may be hypertensive, ischemic, or valvular in nature. The risk factors for AF include: male sex, hypertension, diabetes, thyrotoxicosis, heart failure, valvular disease, and excess alcohol intake. Rarely, AF occurs in a familial pattern; it's probable that more than one gene is involved.

When in atrial fibrillation the patient may feel his/her heart beating rapidly and irregularly (palpitation). Atrial fibrillation may cause chest pain, shortness of breath, dizziness, weakness or fatigue. In some patients there are no accompanying symptoms.

If atrial fibrillation causes chest pain, shortness of breath, dizziness or congestive heart failure, the arrhythmia may be dangerous and need to be corrected promptly. Usually however symptoms are not that severe and the arrhythmia may be dealt with less acutely. The major long-term danger of atrial fibrillation is an increased risk of congestive cardiac failure and stroke. The atria of the heart do not contract properly during atrial fibrillation. Blood flow is sluggish within the atria and this may lead to clot formation. If one of these clots breaks loose, it may travel to other parts of the body (embolism) resulting in stroke (cerebral embolism) or blockage of blood vessels throughout the body. Blockage of vessels to the limbs may cause inadequate blood supply (ischaemia) and endanger the limb. Similarly, blockage of a blood vessel in the abdomen may cause abdominal pain and bowel ischaemia, a condition that is life threatening.

A typical ECG in atrial fibrillation shows a rapid irregular tachycardia

in which recognizable P waves are absent. QRS complexes are generally normal, and the ventricular rate in patients with untreated atrial fibrillation generally ranges between 150 and 220 beats/min. However, in elderly patients, ventricular rates in untreated atrial fibrillation are typically slower. The ventricular rate may be accelerated in the presence of thyrotoxicosis, fever, catecholamines or catecholamine-like drugs, or conditions that enhance sympathetic tone. Although a cardinal feature of atrial fibrillation is irregularity of the RR interval, at the most rapid ventricular rate, this irregularity may be somewhat difficult to discern. An increasing incidence and morbidity due to atrial fibrillation prompted to study the patients with atrial fibrillation in our institution.

Aim Of The Study

1. To Study age, sex distribution and etiologic analysis of atrial fibrillation
2. To study the symptom profile of atrial fibrillation
3. To assess left atrial size and relation of that to permanent atrial fibrillation
4. To assess the incidence of Left atrial clot in cases of atrial fibrillation by Transthoracic Echo

MATERIALAND METHODS

This study was conducted at Kanyakumari Medical College & Hospital, Kanyakumari. This study was conducted during the period of 6 months Jun 2022- December 2022, 100 cases of atrial fibrillation were included in this study.

The Diagnosis of Atrial Fibrillation:

This is made on clinical grounds and then confirmed by electro cardiographic methods.

Clinical Grounds:

1. Irregularly irregular pulse : If the patient was not in failure he or she was exercised and the persistence of the irregularity is noted.
2. Pulse deficit simultaneous counting of the pulse rates by on observer and the heart rate by another of one full minute.
3. Absence of 'a' wave in the jugular venous pulsation, in areas where jugular venous pulsation is seen.
4. On auscultation varying intensity of the first heart sound.
5. Carotid sinus massage once again the irregularity persists though the heart rate is slowed

E.C.G Recording

A 12 lead electrocardiograph was taken for all the cases. It was standardized to produce a deflection of 10mm per 1mv input and the paper speed was set at 25mm per sound. The ECG features of atrial fibrillation are

1. Absence of regular rhythmic 'P' wave
2. Atrial activity is reflected by a variable irregularly corrugated deflection deforming the base line 'F' wave.
3. Marked variation in RR Interval
4. Variation in QRS complex configuration in ECG

Other findings like left ventricular enlargement right ventricular enlargement, right bundle branch block, evidence of ischemia and infarction were also looked.

In all cases, complete history was taken and general examination was done. Further points were noted according to the suspected etiology.

Rheumatic Heart Disease:

1. Features of Rheumatic fever (as per the updated Jones criteria published in 1992, by the American Heart Association)
2. Features of congestive cardiac failure (as per the Framingham criteria, circulation 88:107, 1993).
3. The presence of valvular heart disease
4. Features of infective endocarditis
5. E.C.G for ventricular hypertrophy patterns apart from Atrial Fibrillation.
6. Plain X-Ray of PA view.

Coronary Heart Disease:

1. History
2. Peripheral Arterial Thickening
3. Auscultation for S_3 and S_4 (which may denote reduce compliance of the ventricles)
4. X-Ray for cardiomegaly, pulmonary congestion
5. Serum enzymes and cholesterol.

Hypertensive Heart Disease:

Blood pressure, fundus examinations, E.C.G for left ventricular hypertrophy, X-Ray chest for cardiomegaly, Urine analysis, Blood urea level, if necessary other investigation to find out whether the hypertension is primary or secondary.

Hyperthyroidism:

Eye Signs, Tremors, Thyromegaly Sleeping pulse rate, E.C.G T_3, T_4, TSH. .

Chest Radiography :

A Postero anterior view of the chest radiography was taken and evaluated for evidences of valvular heart disease, congenital heart disease, pericardial effusion, chronic obstructive pulmonary disease, pneumonia etc.,

Echocardiography :

M – Mode, 2-D, Echocardiography was done for all the patients. The rhythm of the heart was looked in to. The presence of thickening of valves, calcification and valve closure was noted, the size of the valve rings and chambers of the heart was assessed. The appendages were specially looked and vegetations also noted. Atrial enlargement, ventricular function also noted.

Diagnosis of Complications

Atrial Fibrillation complicating cardiac failure patients, complete history and examination were done. Electrocardiographic features, chest radiography for cardiomegaly and pulmonary congestion, echocardiographic evaluation of ventricular function, LA size were noted.

Atrial fibrillation complicating stroke, patients neurological examination done. CT scan brain taken and the features were noted. Echocardiography for LA clot, LV function, Valve pattern was noted.

In atrial fibrillation patients features of peripheral embolisation clinically evaluated with peripheral pulses. In all of them echocardiography done for LA size, LV function, Valve pattern and vegetation.

RESULTS

Table 1 - Age Distribution

Age	No.of cases
< 30	24
31 to 45	36
> 45	40
Total	100

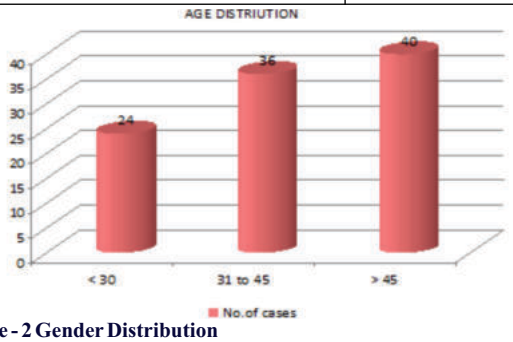


Table - 2 Gender Distribution

Gender	No. of cases
Male	57
Female	43
Total	100

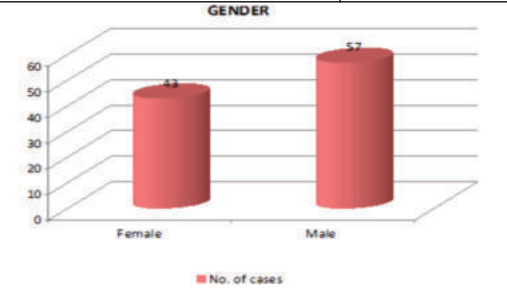


Table - 3 Etiology Distribution

Etiology	No. of cases
Cardiomyopathy	2
CHD	1
Constrictive pericarditis	2
COPD	8
DCM	2
HTN	8
IHD	27
RHD	48
Thyrotoxicosis	2
Total	100

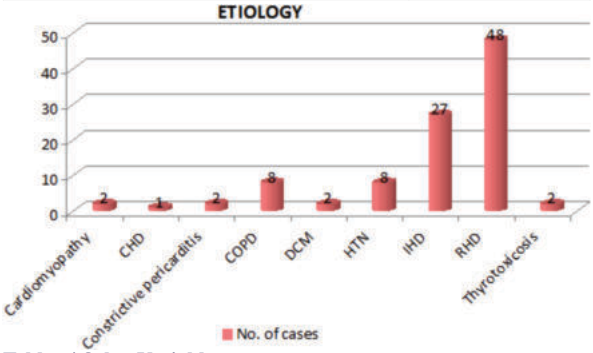


Table - 4 Other Variables

Variables	Mean	Std Dev
Creatinine	1.28	0.197
Urea	42.44	6.845
Bilirubin	0.72	0.311
SGOT	8.81	2.569
SGPT	11.29	2.914
Alkaline Phosphatase	28.54	7.103
T3	1.19	0.239
T4	8.26	0.497
TSH	1.21	0.0874

Table - 5 Valve Area In CM

Valve area cm	No. of cases
< 4	35
> 4	65
Total	100

Table - 6 H/o Rheumatic Fever

H/o Rheumatic Fever	No. of cases
POSITIVE	40
NEGATIVE	60
Total	100

Table - 7 CXR - Cardiomegaly

CXR - cardiomegaly	No. of cases
POSITIVE	36
NEGATIVE	64
Total	100

Table - 8 CCF

CCF	No. of cases
POSITIVE	90
NEGATIVE	10
Total	100

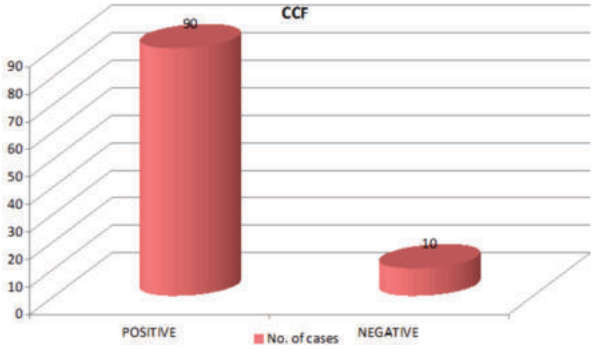


Table - 9 Complications

Complications	No.of cases
Congenitive cardiac failure	90
Cerebral embolism	10
Peripheral embolism	0
Total	100

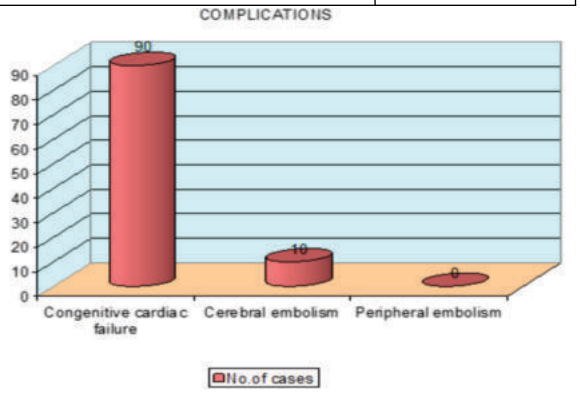
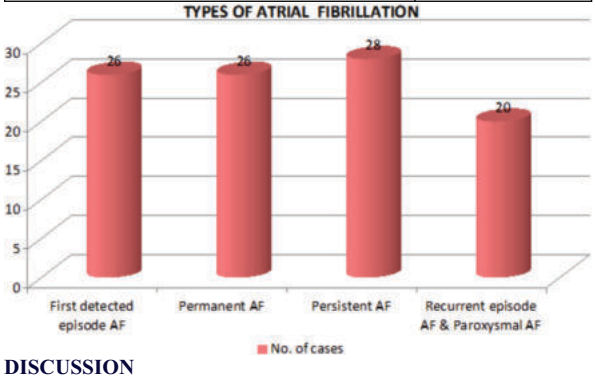


Table - 10 Type Of Atrial Fibrillation

Types of Atrial Fibrillation	No. of cases
First detected episode AF	26
Permanent AF	26
Persistent AF	28
Recurrent episode AF & Paroxysmal AF	20
Total	100



DISCUSSION

An attempt has been made to study 100 cases of Atrial Fibrillation.

Mohan Nair et al[1] concluded that atrial fibrillation is the most commonly sustained arrhythmia, being present in 0.4% of the overall population. This incidence is higher in countries with a high prevalence of rheumatic heart disease (RHD). Jeff S. Healey et al[14] Currently >2.2 million people in the United States have atrial fibrillation, and the annual incidence is approximately 19.2 per 1,000 person-years.

In our study the age incidence is 22 -65 years with mean age of 41.8 years. 40% of study population were >45yrs. 36% between the age group of 31-45 yrs & 24% in the age group of <30yrs. The mean age of the study population is 41.8 years in our study. Benjamin O et al[4] and Abdou Elhandy et al[20] reported mean age as 58 & 67 in their respective studies. Maru[8] reported 136 Ethiopian cardiac outpatients with AF in whom the mean age was 41 years. Crijns et al[35] evaluated 127 patients, the average age of their patients was 60 years all of the above mentioned studies correlates with our study. AFFIRM[3] study reports mean age as 70 years, mean age in James et al study was 71 years. In the last two studies mentioned above age incidence is higher as most of their study population included were above 50 years as the cause of atrial fibrillation differed from our study.

57% of our study population were male which correlates with AFFIRM[3] study were the incidence in males were 61%.Abdou Elhendy[20] reported male incidence as 66%, 52.63% male incidence was reported by Howard .S et al[5]. Framingham[4] heart study showed greater incidence of atrial fibrillation in males. Feinberg[31] also reported increased incidence in males.

In our study, out of 100 case 48% had rheumatic heart disease as the

cause for developing Atrial Fibrillation. Bernand L.J et al[19] in their study concluded 70% of their study population had RHD as etiology. Maru[8] reported 136 Ethiopian cardiac outpatients with Atrial Fibrillation, in whom the mean age was 41 years, and the commonest cause was rheumatic heart disease (66%) ,Samuel levy et al[6] found RHD to cause Atrial Fibrillation in 33% of his study population.A.G Shaper[15] reported that higher incidence of RHD is common in tropical countries.

Crijns et al[35] evaluated the characteristics of 127 patients of atrial fibrillation. Valvular heart disease was the cause in 24% of his study population. AFFIRM[3] study reports very low incidence of rheumatic heart disease in their study, similarly Abdou et al[20] reported low incidence. In western studies the most common cause of atrial fibrillation is hypertension as incidence of rheumatic fever is very low. Studies done in tropical countries show rheumatic heart disease as the major cause of atrial fibrillation which co-insides with our study result. Western studies report hypertension and coronary artery disease as the main cause, as the prevalence of rheumatic fever leading to rheumatic heart disease is not so common in developed countries.

IHD is 2nd most common cause of atrial fibrillation with an incidence of 27% in our study. Samuel Levy et al[6] reported 16.6% of their study population had CAD as a cause for atrial fibrillation. In AFFIRM[3] study CAD was presented 38% of cases. Howard S. Friedman[5] reported 14% of cases. Abdou Elhendy et al[20] reported 34% of cases. According to Gregory lip et al[9] myocardial infarction complicates atrial fibrillation in 10-15% of cases. According to Aberg H[12] in his analysis of 463 patients with atrial fibrillation, coronary artery disease was the underlying cause in 23% of patients. The above mentioned studies correlate with our study regarding coronary artery disease as risk factor, though in some studies the major causative factor was hypertension.

In our study the incidence of systemic hypertension was 8%. Crijns et al[35] evaluated the characteristics of 127 patients with atrial fibrillation were he found . hypertension was the etiological factor in 16% of cases.Abergh[12] in his analysis of 463 cases of atrial fibrillation noticed 34% of cases had systemic hypertension.

According to Framingham[4] study, hypertension accounted for about half of the cases. Hypertension was present in 71% of cases in AFFIRM[3] study. Abdou Elhendy et al[20] reported incidence of systemic hypertension as 51% in their study. The incidence of Hypertension in our study is much lesser than other trials.

Most of the patients in our study population presented to emergency department with shortness of breath as their main complaint 70% (70 patients) with overlapping of other symptoms. Palpitation was present in 11 patients (11%) .Other complaints in decreasing order were chest pain 3% (3 cases),weakness of limbs in 10 cases (10%) ,syncope in 1 case (1%), asymptomatic 5cases (5%).

In the Canadian Registry of Atrial Fibrillation (CARAF)[7], only 21% of patients were asymptomatic on presentation. Among the 79% of patients with symptoms, palpitations occurred in 50%, chest pain and fatigue in more than 25% and dizziness, presyncope or syncope in about 25%.As in our study palpitation was present in 60% of study population , chest pain present in 6%of cases.

In our study, 65% of the cases had Valve area > 4 cms and remaining 35% of the cases had < 4cm valve area. 90% of the cases had CCF features and remaining 10% of the cases had no features of CCF at presentation.

In our study the most common complication is congestive cardiac failure 90% (90 cases). AFFIRM[3] suggests that 32% of their patients had decreased left ventricular function. According to O.T Samani[26] congestive cardiac failure was presented in 64.9% of cases with atrial fibrillation.

The second common complication was increased incidence of thromboemobolic episode in the form of cerebral embolism in atrial fibrillation. In our study 10% patients had cerebral embolism which corresponds with cabin HS , et al[13] who reported cerebral embolism in 85% of cases and peripheral embolism in 15% of cases. Out of the 10 cases, 70% (7 cases) had LA clot which resulted in thromboembolic episode, whereas 30% (3 cases) had no LA clot evident in routine echo study .Goswamy KC et al[41] reported 26% incidence of LA clot in their study on 200 cases of AF, which corresponds to our study.

Yadav R et al[43] in their study on 200 patients with MS reported 25% incidence for LA appendage clot and risk being higher in patients with older age, larger left atrium and atrial fibrillation.

87% patients of our study population had left atrial dilatation which correlates with AFFIRM[3] study where left atrial dilatation was present in 67% of their study population.

Study done by Zabalgoitia et al on 786 patients found out left atrial dilatation was present in 67% of cases, Adbou Elhendy et al[20] in their study reported 81% of cases to have left atrial dilatation were mild enlargement observed in (41%) and marked enlargement seen in (40%) of his study population.All the studies show high incidence of LA dilatation as per our study. LA size more than 4cm was found to be associated with permanent atrial fibrillation.

CONCLUSIONS

1. Mean age of the study population was 41.8 years.
2. Atrial fibrillation seen more in males (57%) than females (43%)
3. Most common cause was RHD (48%) with mitral valve involvement.
4. Common presenting symptom was dyspnoea.
5. 25% of the patients with AF had significant haemodynamic instability requiring cardioversion.
6. CCF was the most common complication in 90% of patients.
7. Echo revealed LA dilatation in 87% of cases.
8. LA clots were present in 70% of pts with cerebral embolism.
9. Left atrial size more than 4cms (65%) of the cases was found to be related to permanent or persistent atrial fibrillation.

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