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ORIGINAL RESEARCH

Clinical Characteristics, Management Strategies, and Outcomes of New-Onset Atrial Fibrillation in Hospitalized Patients

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ABSTRACT

Background: New-onset atrial fibrillation (NOAF) is a major clinical issue for hospitalized patients, linked to clinical outcomes. This study aimed to investigate the clinical characteristics, management strategies, and outcomes of hospitalized patients with NOAF. **Materials and method:** This prospective, cross-sectional study included 100 hospitalized patients who developed NOAF during their hospital stay between June 2019 and May 2021. Demographic data, risk factors, clinical parameters, and management strategies were documented. Patients were followed up for one year with the primary endpoints being all-cause mortality and stroke. **Results:** The mean age of patients was 57.38 years with male predominance (66%). Hypertension (70%) was the most common contributing risk factor, followed by type 2 diabetes mellitus (47%). Among immediate risk factors, pneumonia (65%) and respiratory failure (57%) were prevalent. Paroxysmal AF was the predominant type (82%). Risk stratification revealed that 64% of patients had a CHA_2DS_2-VASc score >2. Electrolyte abnormalities were observed, with hyperkalemia being the most common (7%). During hospitalization, 64% of patients experienced prolonged hospital stays, and the in-hospital mortality rate was 37%. For management, intravenous amiodarone was the most commonly used antiarrhythmic agent (86.02%), while 80% received anticoagulation during the acute phase. **Conclusion:** The NOAF in hospitalized patients is associated with substantial morbidity and mortality. Most patients present with high CHA_2DS_2-VASc scores, indicating significant stroke risk requiring appropriate thromboprophylaxis. While intravenous amiodarone was the primary acute management strategy, the optimal approach to rhythm control and anticoagulation remains challenging in this complex patient population.

Keywords: Atrial fibrillation; clinical characteristic; disease management; hospitalization; outcomes; scores

INTRODUCTION

Atrial fibrillation (AF) is the most common clinical arrhythmia, with a global prevalence ranging from 0.5% to 5.5%. In India specifically, studies have documented prevalence rates varying between 0.1% and 1.6%[1,2]. New-onset atrial fibrillation (NOAF) represents a particularly significant clinical concern in hospitalized patients, as it is associated with increased morbidity and mortality outcomes[3].The clinical presentation of NOAF includes characteristic symptoms such as palpitations, dyspnea, chest pain, and dizziness. Beyond these immediate manifestations, NOAF significantly elevates the risk of stroke and other thromboembolic complications[3]. The clinical profile of affected patients frequently includes advanced age, hypertension, and various cardiovascular risk factors, though presentations can vary considerably based on underlying cardiac conditions and acute triggers, including surgery or severe illness[4].Effective management of NOAF necessitates a multifaceted approach including identification and treatment of triggering factors, implementation of appropriate rate or rhythm control strategies, and anticoagulation therapy guided by risk assessment tools[5]. The CHA_2DS_2-VASc score has become the standard clinical instrument for evaluating stroke risk in AF patients, with higher scores showing direct correlation with NOAF development and adverse outcomes[6].Despite the recognized clinical significance of NOAF, there remains a substantial

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need for detailed studies examining the clinical profiles, management approaches, and short-term outcomes in these patients. This study aims to investigate the clinical characteristics, management strategies, and short-term outcomes of hospitalized patients with NOAF.

MATERIALS AND METHOD

A non-randomized, cross-sectional and prospective study was conducted between June 2019 and May 2021 in tertiary care hospital. The study protocol was approved by the Institutional Ethics Committee, and written informed consent was obtained from all participants prior to enrollment.

Study Population

We enrolled 100 hospitalized patients who developed NOAF during their hospital stay. All hospitalized patients who developed NOAFduring their period of hospitalization were included in the study. Patients below 18 years of age, those with chronic or intermittent AF, patients presenting with AF at the time of admission, and patients unwilling to provide written consent were excluded from the study.

Data collection

Demographic data, medical history, and clinical parameters were recorded for all patients. We documented conditions recognized as AF risk factors or triggers, circumstances of AF onset, and findings from cardiac echocardiography. The following investigations were performed: complete blood count, blood urea nitrogen and serum creatinine, serum electrolytes (sodium, potassium, magnesium, calcium), blood glucose profile (RBS, FBS, PPBS, HbA1C), serial ECGs (on admission, at onset of AF, and at discharge), chest X-ray, 2D echocardiography, and RTPCR for SARS-CoV-2. Additional investigations were performed when clinically indicated, including troponin I, CPK, CPK-MB, BNP, coronary angiography, and arterial blood gas analysis.

Follow up

Patients were followed up at 1 year. At each follow-up visit, ECG, 2D echocardiography, and PT-INR (if on anticoagulants) were performed. The primary endpoints included all-cause mortality and stroke. The secondary endpoint was a drop in left ventricular ejection fraction (LVEF) greater than 10% within 1 year.

Statistical analysis

All data were recorded in Microsoft Excel and analysed using SPSS software. Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Categorical variables were presented as frequencies and percentages, while continuous variables were presented as mean ± standard deviation.

RESULTS

In this study of 100 patients with NOAF, the mean age was 57.38 ± 13.23 years, with a predominant male population (66%) compared to females (34%). Among the contributing risk factors, hypertension was the most prevalent condition affecting 70% of patients, followed by type 2 diabetes mellitus present in 47% of cases. Ischemic heart disease was observed in 21% of patients, while chronic obstructive pulmonary disease (COPD) was present in 14%. Less common comorbidities included hyperthyroidism (9%), chronic kidney disease (8%), obesity (8%), bronchial asthma (6%), and congestive heart failure (2%). Analysis of immediate risk factors revealed that respiratory failure was a significant concern, affecting 57% of patients, while pneumonia was present in 65% of cases. Sepsis was observed in 22% of patients, and urinary tract infections were documented in 17%.**Table 1** describesdemographic characteristics and risk factor distribution among patients with NOAF.Analysis of electrolyte abnormalities revealed that hyperkalaemia (>6.0 Meq/L) was the most common electrolyte disturbance, occurring in 7% of patients. Both hypokalaemia (<3.0 Meq/L) and hyperphosphatemia (>6.0 mg/dL) were observed in 5% of the study population. Hypernatremia (>145 Meq/L) was documented in 4% of cases, while hyponatremia (<128 Meq/L) and hypocalcaemia (<6.5 mg/dL) were each present in 2% of patients. These findings suggest that potassium imbalances were the predominant electrolyte abnormality in this study population, followed by phosphate and sodium disturbances as described in **Table 2**.

In **Table 3** risk stratification using the CHA_2DS_2-VASc score revealed that 64% had a high-risk score of >2, suggesting a significant annual risk of stroke and requirement for oral anticoagulation therapy. Twenty-six percent of patients had intermediate risk scores (1-2), warranting careful consideration of anticoagulation based on individual bleeding risk assessment. Only 10% of patients were classified as low-risk (score of 0), indicating a small subset of patients who might not require anticoagulation. This distribution highlights the substantial proportion of patients requiring thromboprophylaxis in the present study patients.

In **Figure 1**paroxysmal AF was the predominant type, observed in 82% of cases, followed by persistent AF in 8% of patients. The remaining cases were distributed between intermittently persistent AF (4%) and permanent AF (6%), indicating that the majority of patients presented with a paroxysmal pattern of arrhythmia.**Table 4**evaluating the clinical profile and outcomes of hospitalized patients with NOAF, we observed significant morbidity and mortality during the initial hospitalization period. Prolonged hospitalization was required in 64% of patients, reflecting the complexity of management in this population. During the index hospitalization, cardioembolic stroke occurred in 4% of patients, while 2% experienced decreased left ventricular

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ejection fraction. The in-hospital mortality rate was notably high at 37%, underscoring the severity of illness in this patients. Among the 96 patients who completed follow-up, there were two additional cases (2.1%) each of cardioembolic stroke and decreased LVEF, with two deaths (2.1%) during the follow-up period. **Table 5** describes management strategies in patients with NOAF.Among the 93 patients who received antiarrhythmic therapy, intravenous amiodarone was the predominant choice (86.02%), followed by metoprolol (10.75%), while flecainide and diltiazem were used in 2.15% each. Electrical cardioversion was necessary in 18 patients, with 12.90% receiving 75J and 6.45% requiring 100J synchronized cardioversion. For subsequent management in 77 patients, oral amiodarone was the most frequently prescribed medication (76.6%), followed by beta blockers (20.7%) and calcium channel blockers (18.1%). Anticoagulation was initiated in 80% of patients with low molecular weight Heparin (LMWH)/Heparin during the acute phase.

Table 1: Demographic characteristics and risk factor distribution among patients with new-onset of atrial fibrillation

Variables	N=100 patients
Age, years	57.38 ± 13.23
Male	66
Female	34
Contributing risk factors	
Type 2 Diabetes mellitus	47
Hypertension	70
IHD	21
CKD	8
COPD	14
Bronchial asthma	6
CHF	2
Obesity	8
Hyperthyroidism	9
Immediate risk factors	
Respiratory failure	57
Postoperative cardiac surgery	15
Postoperative non-cardiac surgery	6
Sepsis	22
Pneumonia	65
UTI	17
Hypoglycemia	2

Data presented as mean ± standard deviation for continuous variables and percentages for categorical variables. Some patients had multiple comorbidities and risk factors

CHF: Congestive Heart Failure; CKD: Chronic Kidney Disease; COPD: Chronic Obstructive Pulmonary Disease; IHD: Ischemic Heart Disease; UTI: Urinary Tract Infection

Table 2: Distribution of electrolyte abnormalities among patients with new-onset of atrial fibrillation

Electrolyte Imbalance	Range	N=100 patients
Hyperkalaemia	>6.0 Meq/L	7
Hypokalaemia	<3.0 Meq/L	5
Hyperphosphatemia	>6.0 mg/dL	5
Hypernatremia	145 Meq/L	4
Hyponatremia	<128 Meq/L	2
Hypocalcemia	<6.5 mg/dL	2

The data are represented as absolute numbers, percentages calculated from total study population (N=100)

Meq/L: Milliequivalents per litre; mg/dL: Milligrams per decilitre

Table 3: Distribution of CHA_2DS_2-VASc scores among patients with new-onset of atrial fibrillation

CHA_2DS_2 VASc score	N=100 patients
0	10
1-2	26
>2	64

The data are represented as absolute numbers, percentages calculated from total study population (N=100).

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Table 4: Clinical outcomes during hospitalization and follow-up in patients with new-onset atrial fibrillation

Outcomes	Hospitalization N=100 patients	Follow-up N=96 patients
Prolonged hospitalization	64 (64)	-
Cardioembolic stroke	4 (4)	2 (2.1)
Decreased LVEF	2 (2)	2 (2.1)
All-cause mortality	37 (37)	2 (2.1)

The data are represented as absolute numbers and percentages.
LVEF: Left Ventricular Ejection Fraction

Table 5: Management strategies in patients with new-onset atrial fibrillation

Management		Patients
Antiarrhythmic,(n=93 patients)	Inj. Amiodarone	80 (86.02)
	Inj. Metoprolol	10 (10.75)
	Tab. Flecainide	2 (2.15)
	Inj. Diltiazem	2 (2.15)
Cardioversion, (n=93 patients)	Synchronized Cardioversion 75 J	12 (12.90)
	Synchronized Cardioversion 100 J	6 (6.45)
Subsequent, (n=77 patients)	Beta blockers	16 (20.7)
	Calcium channel blockers	14 (18.1)
	Tab. Digoxin	4 (5.2)
	Tab. Flecainide	2 (2.6)
	Tab. Amiodarone	59 (76.6)
Anticoagulant immediate, (n=100 patients)	LMWH / Heparin	80 (80)
Anticoagulant chronic NOAC, (n=80 patients)	<4 weeks	45 (56.25)
	>4 weeks	11 (13.75)
Statin, (n=100 patients)		80 (80)

The data are represented as absolute numbers and percentages.
NOAC: Non-vitamin K oral anticoagulants; LMWH: Low molecular weight heparin

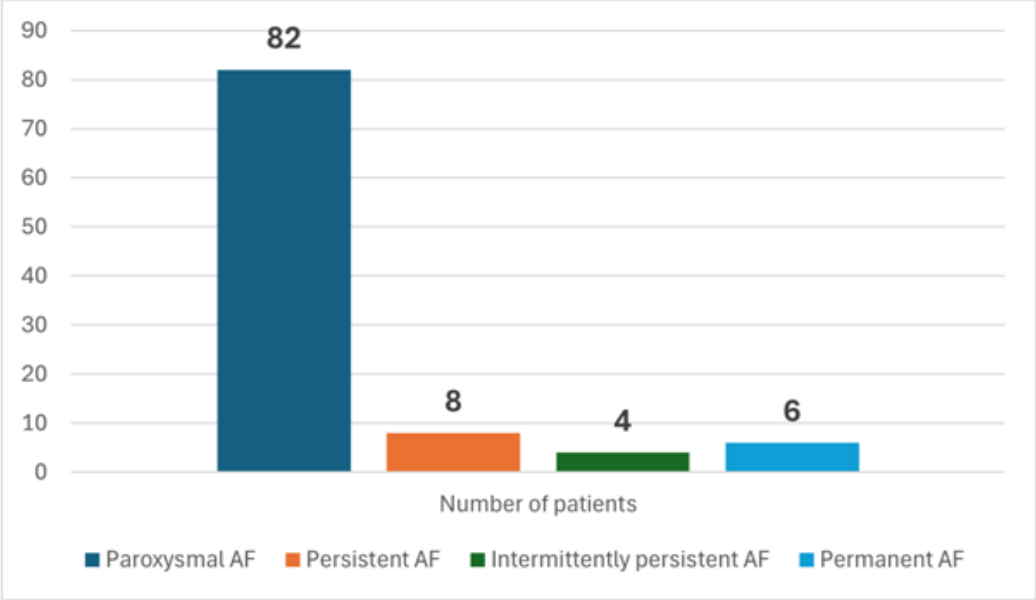

Figure 1: Distribution of patients according to type of atrial fibrillation

DISCUSSION

The present study highlights the significant clinical burden associated with NOAF in hospitalized patients, demonstrating substantial morbidity and mortality. The clinical characteristics and risk factor distribution among patients with NOAF, provide valuable insights into the complex pathophysiology of this arrhythmia.The mean age of 57.38 years in present study population is notable, as Camm et al. observed that AF is often associated with older populations [7].Male predominance, observed in 66% of cases, aligns with previous research by Magnani et al.

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indicating higher incidence rates in men[8]. Hypertension emerged as the most common contributing risk factor (70%), consistent with its recognized role in promoting atrial fibrillation due to increased atrial pressure and fibrosis[9].

In this study, hyperkalemia (>6.0 mEq/L) was the most frequent abnormality (7%), followed by hypokalemia (<3.0 mEq/L, 5%), hyperphosphatemia (>6.0 mg/dL, 5%), hypernatremia (4%), hyponatremia (2%), and hypocalcemia (2%). Hyperkalemia has been associated with conduction abnormalities and arrhythmias, while hypokalemia predisposes to ventricular arrhythmias due to delayed repolarization[10]. The prevalence of hyperkalemia (7%) in this study aligns with previous finding that it occurs in up to 10% of hospitalized patients[10]. Similarly, hypokalemia was observed in 5% of cases, lower than the 15% reported in a broader emergency department population[11]. The CHA_2DS_2-VASc score is a well-established tool for assessing stroke risk in AF patients.These findings align with prior studies demonstrating that most hospitalized AF patients fall into moderate-to-high-risk categories for stroke[12,13].This emphasizes the need for anticoagulation therapy in a majority of patients to mitigate stroke risk. A substantial proportion (64%) of patients with NOAF experienced prolonged hospital stays in present study, consistent with previous findings indicating that NOAF is associated with longer lengths of stay in both ICU and hospital settings. In study done by Brunetti et al. have observed the mean hospital length of stay was significantly longer for patients with NOAF (15.7 days) compared to the control group (10.9 days, $p<0.001$), representing a considerable healthcare burden[14].The hospital mortality rate in present study in patients with NOAF was 37%, supporting the association between NOAF and increased mortality.Corica et al. observed similar findings, noting that patients with NOAF were at a 2.1-fold higher risk of mortality compared to patients without NOAF[15]. It is important to note that the association of NOAF with increased mortality does not necessarily imply causality but rather suggests that NOAF often serves as a marker of more severe underlying illness. This interpretation is supported by studies showing that while NOAF is linked to higher mortality rates, it is not always anindependent predictor of mortality when adjusting for other factors like sepsis and disease severity[13].Regarding management strategies, the majority of our patients (86.02%) received intravenous amiodarone as the primary antiarrhythmic agent, consistent with evidence suggesting that amiodarone is effective for achieving rhythm control in critically ill patients with NOAF[16]. A systematic review by Drikite et al. mentioned that limited evidence suggests beta-blockers may be equivalent to amiodarone for rhythm control[16,17]. While some studies reported reduced mortality in patients who received beta-blockers compared to those who received amiodarone[17,18], there were significant concerns about bias.Despite these limitations, some review articles argued that beta blockers may represent a reasonable first-choice treatment due to current evidence of decreased mortality and improved heart rate control. Two studies also favoured beta-blockers as initial pharmacotherapy, given the limited and indirect evidence available[19,20]. In contrast, five reviews discussed amiodarone as a potentially effective treatment, though they also recognized its potentially significant side effects[21-25].

LIMITATIONS

This study hasrelatively small sample size from a single tertiary care center may limit the generalizability of our findings to broader populations.Despite the one-year follow-up period, longer-term outcomes beyond this timeframe remain unexplored, potentially missing late complications or arrhythmia recurrences. The study did not comprehensively assess the impact of various management strategies on outcomes, making it difficult to establish optimal treatment protocols. Further prospective, multicentre research is needed to establish evidence-based protocols for NOAF management in hospitalized patients, particularly regarding optimal rhythm control strategies and duration of anticoagulation therapy.

CONCLUSION

The present study highlights the significant clinical burden associated with NOAFin hospitalized patients, demonstrating substantial morbidity and mortality. Paroxysmal AF emerged as the predominant pattern, with hypertension and respiratory complications being the most frequent contributing factors. Most patients presented with high CHA_2DS_2-VASc scores, indicating substantial stroke risk that necessitates appropriate thromboprophylaxis. While intravenous amiodarone was the primary acute management strategy, the optimal approach to rhythm control and anticoagulation remains challenging in this complex patient.

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