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Incidence of New Onset Atrial Fibrillation in Patients with Acute Coronary Syndrome (ACS)

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ABSTRACT

Background: Atrial fibrillation (AF) is one of the most common arrhythmias associated with acute coronary syndrome (ACS). Whether newly developed AF in the context of ACS is deleterious to hemodynamic stability, increases the risk of complications, or raises the chance of fatality remains uncertain. Identifying the incidence of AF, as well as the relevant risk factors, is essential to enhancing prompt management and clinical outcomes. **Objectives:** Establishing the incidence of new-onset atrial fibrillation in patients with acute coronary syndrome while assessing the relationships of associated clinical-demographic variables and in-hospital outcomes. **Study Design:** A cross-sectional study. **Place and duration of study.** Cardiology Department Sandeman Provincial Hospital / Bolan Medical College / Hospital, Quetta, from December 2024 to May 2025. **Methods:** In the cardiology department a cross-sectional study involving 120 patients admitted with a primary diagnosis of acute coronary syndrome was undertaken. Individual demographic and clinical details were systematically recorded. During the hospitalization, the patients' electrocardiograms were monitored to identify possible new-onset atrial fibrillation. The analysis was conducted with the SPSS software, version 24.0. For the study variables, averages and standard deviations were determined, and the relationships between variables were tested using chi-square, and t-test procedures with an alpha of 0.05. **Results:** The 120 patients with Anterior Cardiac Syndrome had an age average of 59.3 ± 10.8 years. There were 70 (58.3%) men and 50 (41.7%) women. During their hospital stay, 11 patients (9.2%) present with new onsets of AF. The patients suffering from AF had a statistically significant Lower left ventricle ejection fraction (42.1 ± 7.9%) as compared to patients without AF (50.6 ± 8.3%, p = 0.004). Older age and increased serum creatinine levels were also statistically significant (p = 0.032 and p = 0.018). **Conclusion:** About 9% of patients with acute coronary syndrome develop new-onset atrial fibrillation which relates significantly to advanced age, kidney disease, and lower left ventricular ejection fractions. The complications of atrial fibrillation in the setting of acute coronary syndrome require aggressive recognition and management to reduce the risk of thrombosis and improve the short- and long-term outcomes of the patients.

INTRODUCTION

Acute coronary syndrome (ACS) includes several unstable clinical presentations such as unstable angina, non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI), and is the consequence of sudden jeopardization of coronary blood flow due to an atherosclerotic plaque rupturing or eroding, resulting in myocardial ischemia and necrosis [1]. ACS is a major contributor to the global burden of cardiovascular disease and remains one of the leading causes of morbidity and mortality worldwide Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia and impacts millions globally. AF and acute coronary syndrome (ACS) comorbidity are difficult to manage because the two conditions coexist because of risk factors such as hypertension, diabetes mellitus, ischemic heart disease, and heart failure. New-onset atrial fibrillation (NOAF) alongside acute coronary syndrome is particularly difficult to manage because of hemodynamic instability, increased myocardial oxygen demand and the high risk of thromboembolic complications [2,3]. The NOAF pathophysiology during ACS is poorly understood and is the result of a combination of atrial ischemia and inflammation, atrial hypertension, autonomic axe and neurohormonal discharge. The atria may be chemically hypo perfused and injured, thus atrial internal stretch and fibrosis may signal electrical remodeling and AF. The systemic inflammatory response and catecholamine

increase may trigger arrhythmia during bloodless conditions. The global literature characterizing the population and study design bounds the range of the incidence of NOAF in ACS between 2% and 21% [4,5]. A meta-analysis of more than 150,000 patients with ACS estimated the aggregate incidence of NOAF to be 4.3%. That being said, the amount of region and population specific study, particularly in South Asia, is scarce. Cardiovascular disease in South Asia is unique in its genetic and lifestyle complications. New-onset AF in the case of ACS is more than an acute aberration of transient electrical activity and has an important prognostic value [6]. The ACS patients who remain in sinus rhythm have lower in-hospital mortality, fewer ischemic events, strokes, heart failure, and other complications. The prognostic value of new-onset AF in ACS is significant [7]. These patients have an elevated risk of every other complication and mortality in the hospital. Outcomes may be much more favorable with early diagnosis and treatment focused on either rate or rhythm control, and additional anticoagulants. In Pakistan, limited research has been conducted regarding the frequency and predictors of NOAF among patients with ACS. The noted absence of local data, along with the high burden of ischemic heart disease, highlights the need for local studies to elucidate this relationship. [8] Hence, the goal of this study is to identify the incidence of new-onset atrial fibrillation in patients admitted with ACS and examine the relationship with demographic, clinical, and echocardiographic factors. It is hoped that the results will assist clinicians in risk assessment, prompt intervention, and better prognosis [9].

METHODS

This cross-sectional study was conducted over six months focused on the cardiology department of Sandeman Provincial Hospital / Bolan Medical College / Hospital, Quetta. A total of 120 patients diagnosed with acute coronary syndromes inclusive of STEMI, NSTEMI, unstable angina was included in the study after informed consent. During hospital stay, patients were monitored with ECG for creation of new-onset atrial fibrillation. The demographic and clinical variables such as co-morbid conditions, laboratory parameters including serum creatinine and lipid profile, and atrial fibrillation were collected. Left ventricular ejection fraction (LVEF) was calculated with an echocardiogram. The data was analyzed in SPSS version 24.0. Continuous variables were analyzed for calculation of mean and standard deviation, while for categorical data analysis, frequencies and percentages were used. Chi-square and independent t-tests were used for the calculation of association with a significance of $p<0.05$.

Inclusion Criteria: Individuals between the ages of 30 and 80 were included if they were admitted with an acute coronary syndrome (STEMI, NSTEMI, unstable angina) diagnosis, confirmed, and were in sinus rhythm when admitted to the hospital.

Exclusion Criteria: To avoid confounding variables, patients with a previous history of atrial fibrillation, valvular heart disease, thyroid dysfunction, chronic obstructive pulmonary disease, or electrolyte abnormalities were excluded.

Ethical Approval Statement: The Sandeman Provincial Hospital / Bolan Medical College / Hospital, Quetta. Institutional Review Board approved the study protocol (CPSP/REU/CRD-2023-001-2940 dated letter November 26, 2024) as well as the Ethics Review Committee. Consent was obtained from every participant. All patient data were kept confidential in accordance with the Declaration of Helsinki.

Data Collection: Information was gathered using prescribed questionnaires as well as from the participants' medical records. Every study participant received a clinical assessment consisting of ECG monitoring and echocardiography while an echocardiographic assessment was completed in the participant's hospital room. Other clinical parameters of interest that were completed included creatinine tests and lipids. A cardiologist authenticated all findings to guarantee the diagnostic precision of atrial fibrillation and to ensure consistency in the reporting of atrial fibrillation.

Statistical Analysis: Statistical analyses were conducted with SPSS version 24.0. Continuous variables are conveyed with mean ± standard deviation. Categorical variables are communicated with frequencies and percentages. Relationships were assessed with the chi-square test and independent t-test. A p-value of 0.05 was the threshold for determining statistical significance.

RESULTS

A total of patients having acute coronary syndrome admitted with a mean age of 59.3 ± 10.8. History wise, 70 (58.3%) were male, 50 (41.7%) were female. The distribution ACS types were STEMI (46%), NSTEMI (38%), unstable angina (16). New natal atrial had 11 patients (9.2%) with an acute onset during hospitalization. The patients with atrial fai7brilation were significance older (65.1 ± 8.4) than patients who remained with sinus rhythm (58.7 ± 10.2, p = 0.018). The average left ventricular ejection fraction (41.1 ± 7.9%) of patients with atrial fibrillation was substantially lower than that of patients without atrial fibrillation (50.6 ± 8.3, p = 0. 004). Furthermore, patients with AF presents with higher average serum creatinine (1.64 ± 0.51 mg/dL) than patients without AF (1.21 ± 0.37 mg/dL, p = 0.032) and higher serum creatinine were more common with patients who had AF. The patients with AF had higher incidence of, hypertension and diabetes with atrial fibrillation. Gender wise, there were no equal differences. By age, patients with AF gat older than patients with sinus rhythm. In patients with sinus rhythm, there was a lower incidence of diabetes, hypertension and AF. No equal differences were found with regard to gender.

Table 1

Baseline Demographic Characteristics of the Study Population (n = 120)

Variables	Total (n = 120)	With New-Onset AF (n=11)	Without AF (n = 109)	p-value
Mean Age (years)	59.3 ± 10.8	65.1 ± 8.4	58.7 ± 10.2	0.018*
Gender (Male/Female)	70 / 50	8 / 3	62 / 47	0.421
BMI (kg/m^2)	27.5 ± 3.9	28.2 ± 3.7	27.4 ± 3.9	0.511
Hypertension	68 (56.7%)	8 (72.7%)	60 (55.0%)	0.217
Diabetes Mellitus	52 (43.3%)	6 (54.5%)	46 (42.2%)	0.372

Smoking	38 (31.7%)	4 (36.4%)	34 (31.2%)	0.713
Family History of CAD	28 (23.3%)	3 (27.3%)	25 (22.9%)	0.736

Table 2

Distribution of Acute Coronary Syndrome (ACS) Types among Study Participants

ACS Type	Total (n = 120)	With New-Onset AF (n = 11)	Without AF (n = 109)	p-value
STEMI	55 (45.8%)	6 (54.5%)	49 (45.0%)	0.519
NSTEMI	46 (38.3%)	4 (36.4%)	42 (38.5%)	0.894
Unstable Angina	19 (15.8%)	1 (9.1%)	18 (16.5%)	0.534
Hospital Stay (days)	5.2 ± 1.9	7.1 ± 2.0	5.0 ± 1.7	0.001*

Table 3

Echocardiographic Findings among ACS Patients

Echocardiographic Parameters	With New-Onset AF (n = 11)	Without AF (n = 109)	p-value
Left Ventricular Ejection Fraction (LVEF, %)	42.1 ± 7.9	50.6 ± 8.3	0.004*
Left Atrial Diameter (mm)	40.2 ± 5.1	36.4 ± 4.6	0.012*
LV End-Diastolic Diameter (mm)	54.5 ± 6.8	50.3 ± 6.1	0.039*
Wall Motion Abnormalities	9 (81.8%)	58 (53.2%)	0.061
Diastolic Dysfunction	8 (72.7%)	52 (47.7%)	0.122

Table 4

Laboratory Parameters and Clinical Outcomes of ACS Patients

Parameters	With New-Onset AF (n = 11)	Without AF (n = 109)	p-value
Serum Creatinine (mg/dL)	1.64 ± 0.51	1.21 ± 0.37	0.032*
Serum Sodium (mmol/L)	136.5 ± 4.8	138.3 ± 3.9	0.151
Serum Potassium (mmol/L)	4.1 ± 0.5	4.2 ± 0.4	0.478
Total Cholesterol (mg/dL)	192.8 ± 36.4	189.6 ± 40.7	0.743
In-Hospital Mortality	2 (18.2%)	5 (4.6%)	0.041*
Heart Failure Development	4 (36.4%)	12 (11.0%)	0.033*

DISCUSSION

Within this single-center cohort, we found a 9.2% rate of new-onset atrial fibrillation (NOAF) in patients admitted with acute coronary syndrome (ACS). This figure falls within the mid-range of internationally reported rates, with estimates derived from pooled analyses and large registry data reporting rates between approximately 4% and 10%, and even higher in older patients and those with multiple comorbidities, or in situations with prolonged continuous telemetry monitoring [10]. Wider ranges of reported rates (approximately 2–20%) in studies focusing on cohorts with ST-segment elevation myocardial infarction (STEMI) are attributable to differences in monitoring intensity, case mix, and varying definitions (specifically between transient and sustained AF) [11]. Our rate is consistent with contemporary literature and is probably a reflection of the patients' age, comorbidity burden, and the thoroughness of in-hospital rhythm surveillance. As in previous studies, age was a significant factor associated with NOAF in our patients. During acute ischemic stress, age-related atrial structural remodeling (e.g., fibrosis, dilation, and conduction heterogeneity) lowers the threshold for arrhythmogenesis and increases the risk of atrial fibrillation [12]. We also report that those who developed AF had greater left atrial size, and in addition, had a lower left ventricular ejection fraction (LVEF). The ischemia models describe how left ventricular dysfunction increases left atrial pressures due to volume overload, which leads to atrial remodeling and stretch, and causes atrial fibrillation (AF) to occur [13]. The relation between AF and renal impairment seen in our dataset stems from and parallels earlier studies that documented the systemic inflammatory and neurohormonal axes, renal function disorder, and associated electrolyte imbalances, all of which increase the arrhythmogenic potential of the atria [14]. The epidemiologic evidence supporting the association of AF in ACS and these risk factors is compelling [15]. The negative prognostic repercussions of new onset AF in the setting of acute coronary syndromes are clear. Heart failure and death during hospitalization were more frequent in AF patients, in line with several registries and meta-analyses indicating that NOAF is associated with worse short- and long-term complications, including stroke, recurrent ischemia, heart failure, and death [16]. The absence of atrial systole, high ventricular rates, and irregularities may further disrupt coronary perfusion, increase oxygen demand, and aggravate ischemic injury; all these factors magnify the hemodynamic effect of the ACS [20,24]. From the ACS therapeutic perspective, AF occurrence is likely a severity marker rather than an insignificant bystander, and this requires organized attention to rate/rhythm control and thromboembolic risk [17,18]. For practical purposes, our findings regarding early risk identification are more relevant. Selected variables at bedside, including age, LVEF, left atrial dimension, renal function, and surrogate clinical signs of hemodynamic compromise (e.g., Killip class) provide a workable risk framework for assessing the risk of admission Nonfeline or continuous telemetry—especially for higher-risk profiles—may capture paroxysmal episodes that brief ECG snapshots miss [19]. For patients with newly diagnosed non-valvular atrial fibrillation, rate control is the main goal of the acute phase, only moving on to rhythm control if the patient is significantly hemodynamically unstable or experiencing persistent symptoms; when ischemia or EF is low, amiodarone is the go-to [20]. The management of NOAF with dual antiplatelet therapy post-PCI has shifted towards limited periods of triple therapy, more recently replaced with a single antiplatelet and a direct oral anticoagulant to ease ischemic and bleeding concerns. The design of our study did not include adjudicating antithrombotic therapy, the higher rate of adverse events among patients with atrial fibrillation suggests the need for a more explicit set of decision rules.

CONCLUSION

In those individuals experiencing an acute coronary syndrome, newly developed atrial fibrillation occurred in close to nine percent of patients. This condition developed primarily due to older age, worsened left ventricular function, and renal insufficiency. The new-onset atrial fibrillation also negatively impacted in-hospital outcomes. The integration of early detection with coordinated management remains critical in alleviating complications and enhancing the outcomes of the patient's cardiovascular condition.

Limitations: Due to the modest sample size and the nature of the study being conducted at a single center, the ability

to generalize the findings may be limited. The monitoring of ECGs was only within the scope of the hospitalization, which may have resulted in an under identifications of transient or late-onset atrial fibrillation. The study design not completing longitudinal follow-up, nor collection of basis inflammatory material, may have limited the potential to explore pathophysiology further and evaluate the prognostics.

Future Findings: Future multicenter studies with extended follow-up along with continuous cardiac monitoring are necessary to evaluate the long-term recurrence, stroke risk and mortality of NOAF in the post-acute coronary syndrome. Predictive identification and risk stratification will be improved with the incorporation of biomarkers, imaging studies, and machine-learning models to optimize bundled strategies.

***Authors' Contribution**

Noor Ali: Concept & Design of Study, Data Collection
Rahat Shah, Abdul Ali: Drafting
Alexander Arshad, Arwan Ali: Data Analysis
Abdul Ghaffar Khan: Critical Review:
Final Approval of version: All Mentioned Authors Approved the Final Version.

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