Int. J Med. Pharm. Res. (P-ISSN: 2958-3675 | E-ISSN: 2958-3683)
Available on: https://ijmpr.in/

International Journal
of Medical and Pharmaceutical Research

ORGINAL ARTICLE **OPEN ACCESS**

Impact of New Onset Atrial Fibrillation in Medical ICU of a Tertiary Care Centre: An Observational study

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OPEN ACCESS

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Received: 02-09-2024
Accepted: 27-10-2024
Available online: 30-10-2024

A B S T R A C T

Background: Atrial fibrillation (AF) is the most common arrhythmia seen in critically ill patients, which leads to mortality and morbidity. Purpose of this study was to assess the impact of new onset AF in critically ill patients.***Methods:*** We have designed an observational study, with participants aged more than or equal to 18 years, having new onset AF in medical ICU from 1st January, 2024 to 30th September, 2024 with previous documentation of normal sinus rhythm.***Results:*** 28 patients developed new onset AF during the study period in medical ICU. 42.8% was of cardiac origin, whereas 57.2 % was of non-cardiac origin. Mortality was higher among AF of non-cardiac origin. Mortality was higher among hemodynamically unstable patients. New onset AF and mortality in this group was directly proportional to SOFA (Sequential Organ Failure Assessment) score.

Keywords: Atrial fibrillation, Medical ICU, Mortality, New onset atrial fibrillation.

INTRODUCTION

Atrial fibrillation (AF) is chaotic and disorganised electrical and mechanical activation of atria, presenting as rapid, irregularly irregular pulse. AF is the most common arrhythmia seen in critically ill in Intensive Care Unit (ICU) setting. Stasis of blood secondary to ineffective contraction leads to thromboembolism. Most common site of thrombus formation is left atrial appendage [1, 2].

Causes of new onset AF may include any cardiac disease, pulmonary disease, electrolyte abnormalities (hypokalemia, hypomagnesemia), uremia and any tachycardia such as atrial tachycardia or flutter with 1:1 block [1].

AF can be classified into paroxysmal, persistent, long standing persistent or permanent AF. All of the above have equal risk of thromboembolism. In acute AF, rhythm control is preferred, either by pharmacological cardioversion in stable patients or DC cardioversion in unstable patients. Anticoagulation using unfractionated heparin (UFH) or low

molecular weight heparin (LMWH) is started before cardioversion and continued for 3 weeks, after which the need for anticoagulants is decided based on CHA2DS2VASc score. New onset AF along with its complications adds on to the already poor prognosis of patients [1, 3, 4].

The purpose of this study was to assess the impact of new onset AF on critically ill patients in medical ICU.

RESEARCH METHODS:

A. **Study design:** Hospital based cross sectional study
B. **Study period:** January,2024 to September, 2024
C. **Place of study:** A.J. Institute of Medical Sciences and Research centre, Mangalore
D. **Sample size:** All patients above age of 18 years admitted to A.J Institute of Medical Sciences and Research centre medical ICU with normal sinus rhythm at admission during the study period were included in the study after providing informed consent for participation.
E. **Data collection:** After obtaining a written informed consent from the study subject or attenders and maintaining confidentiality, patients above age of 18 years admitted to medical ICU with normal baseline sinus rhythm were considered. Medical records and case sheets were referred whenever necessary to collect additional information. SOFA score was calculated on admission.

F. Inclusion Criteria:

1. Age>/= 18 years
2. Normal sinus rhythm on admission
3. Structurally normal heart at presentation
4. SOFA>/= 2

G. Exclusion Criteria:

1. Age < 18 years
2. Baseline AF on admission
3. Structural heart disease present on admission
4. Past history of cardiac disease
5. Preexisting AF and patient on antiarrhythmic for the same.

H. Continuous variables are expressed as the mean ± standard deviation (SD). The primary outcome that is mortality was expressed as percentage.

RESULTS:

	Death	**Survived**	**Mean SOFA score**
New onset AF (28)	19	9	7.2 +/- 1.9
Non AF (270)	89	181	3.1 +/- 0.6

	Cardiac origin	**Non cardiac origin**
New onset AF (28)	12 (42.8%)	16 (57.2%)
Death	6	13

Based on inclusion and exclusion criteria, 298 patients aged >/= 18 years with normal baseline sinus rhythm admitted to medical ICU in the study period of 9 months were included in the study, out of which 28 patients (9.4%) developed new-onset AF. Majority of new onset AF belonged to age group of 61-70 years (n=16, 57%). Majority were males (n=18, 64%).

Mortality was higher among new onset AF group (67.8%) compared to non AF group (33%). Relative risk of mortality with new onset AF was 2.06. Mean SOFA score was observed to be higher in the new onset AF group.

42.8% of AF were of cardiac origin and 57.2% of non-cardiac origin. But the mortality was observed to be higher in non-cardiac group (81.2%) compared to those of cardiac origin (50%).

New onset AF (n=28)	Death	Survived
Number	19	9
Mean SOFA score	8.8 +/- 1.1	3.8 +/- 0.5

Out of 28 new-onset AF, 19 patients who died were hemodynamically unstable, on ionotropic support. Out of 9 patients who survived, 3 were hemodynamically unstable in whom DC cardioversion was done and rest were pharmacologically cardioverted. Mean SOFA score was higher among new onset AF who passed away compared to those who survived.

DISCUSSION

Atrial fibrillation is the most common arrhythmia and commonly seen with increasing age. AF is the price we pay for aging. Incidence of new onset AF in critically ill patients was 9.4 % which is consistent with other studies. As per Yoshida et al. incidence of new-onset AF varied from 4.5% to 15.0%, which aligns with our study results. Majority was seen in elderly age group (61-70 years) which is consistent with literature [5].

Relative risk of mortality among new onset AF group was 2.06 which is comparable to other studies. According to Qian et al. new-onset AF was found to be associated with significantly higher 90-day and hospital mortality than non-AF and preexisting AF [6].

Sepsis may alter electrical conduction and cause structural changes in heart. Electrolyte abnormalities are also commonly observed in critically ill patients which can cause new-onset AF. Pulmonary disease, uremia and any tachycardia like atrial tachycardia with block can also cause atrial fibrillation. Severity of illness (APACHE II, SAPS II, SIRS, shock), organ failures, and sepsis were all identified as risk factors of AF in multiple studies. Comparison of our findings with those of other studies confirms that sepsis was associated with an increased mortality risk in critically ill patients with AF. New onset AF and mortality was directly proportional to SOFA score [7, 8].

Management of atrial fibrillation in critically ill patients is controversial. Walkey et al. demonstrated increased risks of stroke associated with new-onset AF in septic shock patient. New-onset AF might go undiagnosed or may be diagnosed late. As it is associated with high mortality and morbidity, it is the need of hour to be vigilant, and to revert the rhythm early to prevent further morbidity. Certain other challenges in critically ill patients are deranged coagulation profile secondary to sepsis or septic shock which poses a hindrance to anticoagulation for cardioversion. In our study, among the 22 hemodynamically unstable patients, 12 patients' rhythm reverted to normal sinus rhythm. Among them 5 developed coagulopathy secondary to multiple causes, in who anticoagulants had to be withheld. These situations needs to be further studied, and guidelines needs to be formulated for these special situations [4, 6].

CONCLUSION

Incidence of atrial fibrillation has been increasing throughout the world and is higher among the critically ill patients. This study shows that new-onset atrial fibrillation is associated with higher mortality. New onset AF and mortality in the same is also higher among those with higher SOFA score. Mortality was higher among AF of non-cardiac origin and in hemodynamically unstable patients.

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