Original Article

Complications of Atrial Fibrillation

Frequency and in Hospital Complications of Atrial Fibrillation in Patients with Acute ST Segment Elevation Myocardial Infarction

Hafiz ur Rehman, Bilal Ahmed, Abdul Hadi and Iftikhar Ahmad

ABSTRACT

Objective: To determine the frequency and in-hospital complications of atrial fibrillation in patients with acute ST segment Elevation myocardial infarction (STEMI).
Study Design: Observational / descriptive study.
Place and Duration of Study: This study was conducted at the Coronary Care Unit (CCU), Saidu Teaching Hospital, Saidu Sharif Swat from October 2015 to September 2016.
Materials and Methods: This was a hospital based study in which 536 male and female patients were included, who were admitted with acute ST segment elevation myocardial infarction. These patients were observed for the development of atrial fibrillation. Those patients in whom AF was documented were further observed for complications in the form of VT, VF, stroke and death during hospital stay.
Results: There were 298 (55.59%) male and 238 (44.40%) female patients. Mean age of the study population was 60.5±9.8 years.
49 (9.14%) patients developed AF. 20 (40.81%) were male, and 29 (59.18%) were female. Out of 49 patients with AF ventricular fibrillation developed in 18.36%, VT was found in 14.28% patients, 12.25% had a stroke, and the mortality rate was 14.28%.
Conclusion: Atrial Fibrillation is quite common complication of acute MI in our population, and carries higher rates of in-hospital complications and death. So these patients need to be identified and treated in time.
Key Words: STEMI, AF, Tachyarrhythmia, Myocardial infarction.

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INTRODUCTION

Atrial fibrillation (AF) is a supraventricular arrhythmia characterized electrocardiographically by low-amplitude baseline oscillations (fibrillatory or f waves) and an irregularly irregular ventricular rhythm, which may lead to pulmonary edema and serious hemodynamic disturbance. AF is associated with approximately a fivefold increase in the risk of stroke and a twofold increase in the risk of all-cause mortality[1].

AF is the most common tachyarrhythmia. In general population the prevalence of AF is 1 to 2 %[1]. We don't have a reliable data regarding the prevalence of AF in Pakistan, however one study conducted in Karachi the reasons for emergency medical admissions were studied, and AF was found as the reason for admission in 6.5% patients[4].

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Myocardial ischemia is a well-known cause for the development of AF. In different studies the incidence of AF in patients with acute myocardial infarction (AMI) is 6 to 21%[5]. In this clinical setting, the occurrence of AF is of particular importance since rapid and irregular ventricular rates during the arrhythmia may cause further impairment of the coronary circulation and left ventricular function.

7 days mortality is higher in patients who develop AF during the acute phase of MI (5.1%) compared to those who remain in sinus rhythm (1.6%) [6]. In patients with acute MI any type of AF (new onset, persistent, or paroxysmal) is associated with increased mortality[7]. New onset AF in patients with AMI is associated with adverse in-hospital outcomes[8]. In patients with acute MI the hospital course is complicated and in-hospital mortality is high (13.8%) in those who develop AF compared to those who do not have AF (5.8%) [10]. These patients also develop Sustained ventricular tachycardia (VT) and ventricular fibrillation (VF) more frequently [10]. AF during MI increases the risk of stroke (9.2%) compared to those without AF (2.6%) [11].

The main purpose of this study was to determine the frequency of AF in patients with AMI in our population and observe them for short term complications during hospital stay. The reason for doing this study was that generally AF is considered as a benign arrhythmia and it is not considered as a critical event in patients with

acute MI, but review of the available literature shows higher short term and long term complications associated with AF in patients with AMI. The other thing is that there is no local data available on this issue. So hopefully this study will make the foundation and basic frame work for further research in this area.

MATERIALS AND METHODS

Ethical issues: Informed signed consent was collected from all volunteers who participated in the study, after the purpose, nature and risks of the participation were fully explained to them verbally and in writing.

Operational definitions: Atrial Fibrillation was defined as disturbance of heart rhythm seen on ECG as rapid, irregular fibrillatory waves associated with irregularly irregular ventricular response.

Acute Myocardial Infarction was diagnosed on the basis of all of the following

1. Characteristic chest pain.
2. ECG showing: ST segment elevation of > 1 mm in two or more than two contagious leads.
3. Elevated serum troponin levels.

In-hospital complications: The following were included.

Stroke: Focal neurological deficit lasting >24 hours and/or an acute clinically relevant brain lesion on CT scan brain {a focal area of decreased attenuation (infarct)}, occurring inside the hospital till 7 days after diagnosis of AF among patients with AMI.

Ventricular arrhythmias (VA): included VT and VF when occurred inside the hospital till 7 days after diagnosis of AF among patients with AMI.

a) **Ventricular Tachycardia (VT):** It is rhythm disturbance seen on ECG as 3 or more consecutive wide QRS complexes occurring at a rate of more than 120 beats/ min and originating from the ventricle recorded either on ECG or on the ECG monitor.
b) **Ventricular Fibrillation (VF):** It is seen on ECG as large undulations of varying amplitudes and shape with no definite P or QRS complexes.

In-Hospital mortality: was defined as death inside the hospital due to cardiac event till 7 days after diagnosis of AF in patients with STEMI.

Subjects: A total of 536 male and female patients of different age group admitted with acute MI were monitored for AF during hospital stay.

Inclusion criteria: adult patients admitted to cardiology unit with STEMI.

Exclusion criteria: Those Patients who were already having serious underlying disease like malignancies, renal impairment, Chronic lung disease, or decompensated liver disease, and patients who were having persistent or long term persistent AF were excluded from the study.

This study was conducted in Coronary care unit (CCU), Saidu Group of Teaching Hospital from 01/10/ 2015 to 30/09/2016. The sampling technique was non probability consecutive sampling.

A total of 536 patients were included in this study.

The study was conducted after approval from hospitals ethical and research committee. Patients who were meeting the inclusion criteria were admitted through OPD and ER and included in the study. STEMI diagnosis was based upon the criteria already mentioned in operational definitions. The purpose and benefits of the study was explained to all patients and written informed consents were obtained.

Detailed history was taken from all the patients, followed by complete routine examination and baseline investigations including ECG (Cardiofax) and echocardiography (eSaote my lab), and Troponin I levels were checked.

ECG's of all these patients were analyzed by single consultant cardiologist for Atrial Fibrillation. All these patients were monitored during hospital stay for any disturbance in heart rhythm, At least 3 times daily ECG's were obtained and analyzed for atrial fibrillation by the same cardiologist.

Any patient who developed AF during hospital stay was observed for complications in the form of stroke, VT, VF, and death during hospital stay. For those patients who developed features of stroke, a CT brain was performed and then it was reported by consultant radiologist of the hospital. All the patients who were included in this study received standard treatment. Their management protocols were decided by senior cardiologist.

All the information including demographic features and hospital admission number were recorded in a pre-designed proforma. Strictly exclusion criteria were followed to control confounders and bias in the study results.

RESULTS

Data was available on 536 patients admitted with STEMI. 298 (55.59%) were male and 238 (44.40%) were female. The age range of the patients was from 34 to 94 years. The mean age was 60.5$\pm$9.8 years. Age distribution among patients who presented with acute myocardial infarction is given in Fig 01. 49 (9.14%) patients developed AF. Male patients were 20 (40.81%) while female were 29 (59.18%).

Among 49 patients who developed AF no patient was 40 years or below Table 01.

Ventricular Fibrillation (VF) was the most common complication which occurred in 9 patients (18.36%), followed by Ventricular Tachycardia (VT) in 7 (14.28%) patients Table 02.

In hospital complications were analyzed and it was found that all those patients who had stroke were having age above 70 years, 2 of them (33.33%) were male and 4 were female (66.77%).

One death occurred in 61 to 70 years age group, while 6 died in above 70 years age group. 4 were male and 3 female,

3 patients in 51 to 60 years age group, 3 in 61 to 70 years age group, and 1 patient in above 70 years age group developed VT. Male were 5 and 2 were female.

Among 9 patients who developed VF, 4 were 61 to 70 years old, and 5 were more than 70 years old.

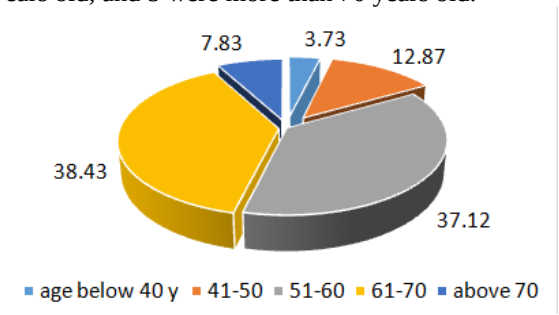

Figure No. 1: Age distribuation of patients presenting with acute MI

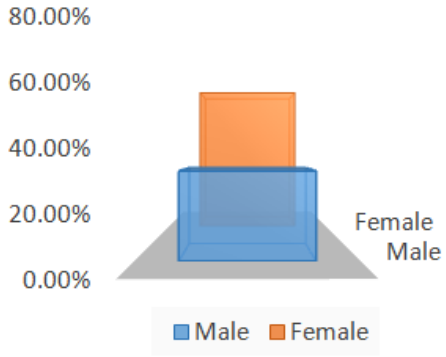

Figure No.2: Gender distribution of AF

Table No.1: Age distribution of patients who had AF

Age group in years	No. of cases with AF
40 or below	0
41-50	2
51-60	2
61-70	9
Above 70	9

Table No.2: Distribution of in hospital complications in different age groups

In hospital complications	< 40 yrs	41-50 yrs	51-60 yrs	61-70 yrs	>70 yrs	Total
Death				1	6	7
Ventricular Tachycardia			3	3	1	7
Stroke					6	6
Ventricular Fibrillation				4	5	9

DISCUSSION

Among different tachy arrhythmia's Atrial Fibrillation is the most common. It can results in hemodynamic disturbances tachycardia induced cardiomyopathy and thrombo embolic complications. Apart from other factors one important cause for the initiation and maintenance of AF is myocardial ischemia. During an acute ischemic event the development of AF and fast ventricular rate will worsen the condition by reducing the coronary flow and myocardial performance.

We studied the frequency of AF in patients with STEMI was 9.14%, and our results are comparable with similar studies done in other countries. In our country no data is available on similar problem. Haq U and colleagues studied the reason for emergency medical admissions to hospitals in Karachi, 47% of these patients were having ischemic heart disease and 6.5% of them also had AF[4].

J Schmit et al analyzed 20 different studies on this topic and found that among patients with acute myocardial infarction 6 to 21% develop AF5. Lopes RD et al found AF in 7.5% patients with Acute MI[6] (both STEMI and NSTEMI), in the subgroup analysis of this study the frequency of AF was found to be 8% in patients with STEMI which is comparable with our results.

We found in our study that AF is more common in elderly patients and in female patients, these findings are comparable with results from GISSI III trial[24] and other trials which were included in a meta-analysis done by Patrica Jabre[9].

Generally AF is considered as a benign arrhythmia even in the sitting of acute MI, however the available data shows controversial prognostic influence of AF in patients with MI, there are studies which shows adverse effect on mortality but there are others studies which do not show this effect[9]. We found a mortality rate of 14.28 % in patients who had AF. RD Lopes and his colleagues found that mortality was 5.1% in patients with AF compared to 1.6% in patients who remained in sinus rhythm during the acute event[6] but if we look at earlier trials the mortality associated with this condition is high. In GUSTO-I[10] trial the mortality is 13.8% and this was the time when streptokinase was the only treatment available for reperfusion therapy. In our patients the incidence of stroke is 12.25% in patients with AF while Aronson D and his colleagues[11] found it in 9.2% patients with AF compared to 2.6% in sinus rhythm.

14.28% of our patients with AF developed VT, and 18.36% were complicated by VF, while in GUSTO I trial[10] VT was found in 14.8% and VF in 14.7% patients with AF, so the incidence of VF is high in our patients.

From the review of available literature it is evident that our results are comparable with the results of earlier studies like GUSTO I and GISSI III when streptokinase was the only therapy available for reperfusion. Recent trials in the era of improved reperfusion therapies shows a reduction in complications and mortality in this group of patients, but when compared to patients who remained in sinus rhythm the morbidity and mortality is

still significantly higher than those who developed AF at some stage during the acute event of MI.

Our study was limited to only short term complications and there was no comparison with patients who were in sinus rhythm, so further research work is needed in this area to see the true effect of atrial fibrillation in the sitting of acute myocardial ischemia, and follow the patients for long term complications.

CONCLUSION

AF is common in the sitting of acute myocardial infarction, and result in complications and increases the mortality. So all patients with MI should be closely observed for AF, and any patient with should be managed in time. In important issues in the management of these patients are Rate control, rhythm control and prevention of thrombo embolic events.

Author's Contribution:

Concept & Design of Study:	Hafiz ur Rehman
Drafting:	Hafiz ur Rehman & Bilal Ahmed
Data Analysis:	Bilal Ahmed & Abdul Hadi
Revisiting Critically:	Iftikhar Ahmad & Abdul Hadi
Final Approval of version:	Hafiz ur Rehman & Bilal Ahmed

Conflict of Interest: The study has no conflict of interest to declare by any author.

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