Original Research Article

Association of comorbidities in atrial fibrillation in acute myocardial infarction

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ABSTRACT

Background: Atrial fibrillation is a most common arrhythmia in patients with and without structural heart disease with an increasing incidence mainly due to the aging population. As the population ages, one can expect that AF will remain a frequent and troublesome complication of AMI with comorbidities. Therefore, the present study was undertaken to investigate the association of co-morbidities in atrial fibrillation in acute myocardial infarction.
Methods: The study was performed after the institutional ethical clearance and consent from all the patients. Heart rate, atrial fibrillation, blood pressure, ventricular fibrillation and stroke after acute myocardial infarction were recorded. The blood sugar and serum lipid levels were also measured using commercially available kit as per the manufacturer's guidelines. The data was analyzed for statistical significance using univariate analysis and comparison was performed by Fisher Exact test and by using SPSS Version 20.
Results: In our study, all the patients who developed AF after AMI were more than 60 years of age. Higher heart rate was more than or equal to 100 in 62.5% of the patients. 25% of patients had diabetes mellitus 75% of 8 patients had atrial fibrillation after acute myocardial infarction, 77% of patients without atrial fibrillation were known hypertensive's. Out of the patients who had atrial fibrillation, 50% had hyperlipidemia and developed ventricular fibrillation.
Conclusions: Higher heart rate (>100 bpm) at time of presentation is a risk factor for AF following to AMI. Patients with new onset AF after AMI had more complication during hospital stay.

Keywords: Atrial fibrillation, Blood Pressure, Heart rate, Stroke after acute myocardial infarction, Ventricular fibrillation

INTRODUCTION

Atrial fibrillation (AF) is the most common arrhythmia in patients with and without structural heart disease with an increasing incidence mainly due to the aging population. Data from large epidemiological studies have clearly demonstrated that AF is associated with an increase in mortality and morbidity. The combination of AF and congestive heart failure is particularly ominous in that it appears that the development of either condition has a marked detrimental impact upon the mortality of the other. Atrial fibrillation can also complicate acute coronary syndromes, particularly ST-segment elevation acute myocardial infarction (AMI). 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 in addition to the adverse consequences of neuro-hormonal activation. Atrial fibrillation is associated with a high mortality which may be due in part to the development of AF as a

surrogate or marker of heart failure; elevated filling pressures and atrial volume overload.[1]

Atrial fibrillation may also give rise to the occurrence of severe ventricular tachyarrhythmia's perhaps due to ischemia, varying R-R intervals, or as a result of activation of the sympathetic nervous system.[2,3] Despite these clinically important considerations, there are no firm therapeutic guidelines which specifically address critically important issues such as the role of antiarrhythmic drugs, pharmacological rate control, and prevention of thrombo-embolism in patients with AF complicating AMI.

Atrial fibrillation is a common complication of AMI, with a reported incidence of between 2.3 and 21%.[4] The higher figures usually include individuals with pre-existing atrial fibrillation, and the probable incidence of new atrial fibrillation is closer to 5%. Its etiology may include left ventricular dysfunction with hemodynamic disturbances, pericarditis, metabolic abnormalities, excess catecholamine release or iatrogenic factors (e.g., use of sympathomimetic drugs). Left atrial ischemia or infarction may also be a cause, particularly in patients who develop atrial fibrillation within 3 hours of Myocardial Infarction onset.[5]

Goldberg et al and associates conducted a longitudinal study of 2596 patients with an initial AMI and no previous AF. Between 1990 and 1997, the incidence of AF complicating AMI decreased from 18% in 1990 to 11% in 1997, probably as a result of improved therapy including more wide-spread use of thrombolysis.[6] Comparable AF incidences were found in AMI patients undergoing primary PCI. For instance, Kinjo et al. published data from the OACIS study which included 2475 patients that were treated with PCI within 24 hour. In this study, AF occurred in 12% of patients.[7]

The wide-spread use of interventional coronary revascularization (PCI), especially during the acute phase, has been associated with a notable decline in the AF incidence. Not unexpectedly, trials evaluating the effects of ACE, AT II-inhibitors, or b-blockers on mortality and morbidity in patients with AMI reported the lowest incidence rates of AF in the setting of AMI but the major impact of this pharmacological therapy was upon the late development of AF. As our population ages, one can expect that AF will remain a frequent and troublesome complication of AMI. Therefore, the present study was undertaken to investigate the association of co-morbidities in atrial fibrillation in acute myocardial infarction.

METHODS

In the present prospective study, the patients were recruited after their informed consent. The study was approved by the institutional ethical committee. All patients presenting to the hospital within 12 hours of symptom onset, with chest pain lasting ≥ 20 min and accompanied by electrocardiographic (ECG) signs of ≥ 0.1-mV ST segment elevation in two or more limb leads or ≥ 0.2 mV in two or more contiguous precordial leads were recruited for the study. The patients with chronic atrial fibrillation and thyrotoxicosis were excluded.

The parameters like heart rate, atrial fibrillation, blood pressure, ventricular fibrillation and stroke after acute myocardial infarction was recorded by the same examiner in the patients. The blood sugar and serum lipid levels were also measured using commercially available kit as per the manufacturer's guidelines. The data was represented as percentages.

The data obtained was represented as percentages and was analyzed for statistical significance in AF and non-AF patients using univariate analysis and statistical comparison was performed by Fisher Exact test and by using SPSS Version 20. P value less than 0.05 was considered the level of significance.

RESULTS

The present study was carried out at in a tertiary care hospital at Bijapur. A total 100 patients of Acute Myocardial Infarction were included in the study. Detailed history was taken and clinical examination was done as per proforma. In the present study, there were 72 males and 28 females with a male to female ratio being 13:7(Figure 1). Out of 100 patients, 63 patients were more than 60 years age i.e. is 63% of the total patient and 37 patient were less than or of 60 years age. All patients who developed AF after AMI were more than 60 years of age (Table 1). Higher heart rate i.e more than or equal to 100 was found in 62.5% of the patient who developed AF after AMI whereas among patients did not develop AF only 13% of the patient had heart rate less than 100 (Table 2).
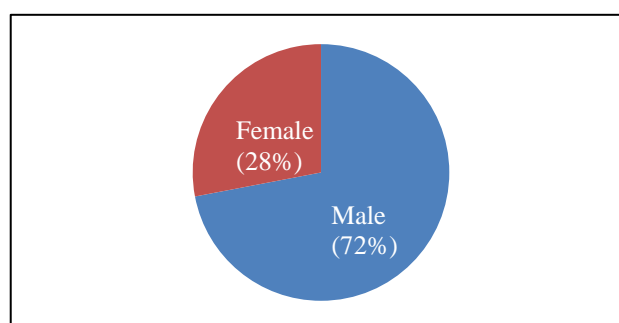

Figure 1: Gender wise distribution of patients included in the study.

Out of 8 patients who had AF, 2 patients (25%) had diabetes mellitus on the other hand 34 patients (37%) who didn't have atrial fibrillation had diabetes mellitus (Table 3). 6 patients (75%) out of 8 patients who had atrial fibrillation after acute myocardial infarction were hypertensive whereas 65 patients (77%) without atrial

fibrillation were known hypertensive (Table 4). Out of 8 patients who had atrial fibrillation, 4 patients (50%) had hyperlipidemia the other hand only 67 patients(72%) who didn't had atrial fibrillation were had hyperlipidemia (Table 5).

Table 1: Association of age and atrial fibrillation after acute myocardial infarction.

Age in years	Atrial fibrillation	No Atrial fibrillation	Total
>60	8 (100%)	55 (60%)	63
≤60	0	37 (40%)	367

Fisher's exact test: P = 0.0245*; *Significant

Table 2: Association of heart rate in relation to atrial fibrillation after acute myocardial infarction.

Heart rate	Atrial fibrillation	No atrial fibrillation	Total
≥100	5(62.5%)	12(13%)	17
< 100	3(37.5%)	80(87%)	83

Fisher's exact test: P = 0.0033** **Very highly significant

Table 3: Association of diabetes mellitus and atrial fibrillation after acute myocardial infarction.

Diabetes mellitus	Atrial fibrillation	No Atrial fibrillation	Total
Present	2(25%)	34(37%)	36
Absent	6(75%)	58(63%)	64

Fisher's exact test P = 0.7075 NS NS= Not significant

Table 4: Association of hypertension and atrial fibrillation after acute myocardial infarction.

Hypertension	Atrial fibrillation	No Atrial fibrillation	Total
Present	6(75%)	65(77%)	71
Absent	2(25%)	27(33%)	29

Fisher's exact test P = 1.00 NS; NS= Not significant

Table 5: Association of hyperlipidemia and atrial fibrillation after acute myocardial infarction.

Hyperlipidemia	Atrial fibrillation	No Atrial fibrillation	Total
Present	4(50%)	67(72%)	71
Absent	4(50%)	25(28%)	29

Fisher's exact test P = 0.2246 NS ; NS= Not significant

Table 6: Association of ventricular fibrillation and atrial fibrillation after acute myocardial infarction.

Ventricular fibrillation	Atrial fibrillation	No atrial fibrillation	Total
Present	4 (50%)	7 (72%)	11
Absent	4 (50%)	85 (28%)	89

Fisher's exact test P = 0.0040**; **Very highly significant

Table 7: Association of stroke and atrial fibrillation after acute myocardial infarction.

Stroke	Atrial fibrillation	No atrial fibrillation	Total
Present	2 (25%)	1 (1%)	3
Absent	6 (75%)	91 (99%)	97

Fisher's exact test P = 0.0040** **Very highly significant

Out of 8 patients who had atrial fibrillation, 4 patients (50%) developed ventricular fibrillation the on other hand only 7 patients (8%) who didn't had AF developed ventricular fibrillation during hospital stay (Table 6). Out of 8 patients who had atrial fibrillation, 2 patients (25%) developed stroke the on other hand only 1 patients(1%) who didn't had atrial fibrillation developed ventricular fibrillation during hospital stay (Table 7).

DISCUSSION

In the present study overall incidence of AF in AMI is 8%, 63% patients were aged 60 years or more, incidence of AF in AMI in patients older than 60 years is 12.69%. Siu et al showed that incidence of 13.7% for AF after AMI.[8] Koberet al in VALIANT study showed incidence of AF after AMI.[9] Laurent et al in RICO study showed incidence 7.6%.[10] McMurray et al in CAPRICORN study showed incidence of 2.7-5.5%.[11] Letho et al in OPTIMAAL study showed incidence of 7.2%, Wong et al in GUSTO III study showed incidence of 6%, Crenshaw et al in GUSTO I study incidence of 11.2% and also by Goldberg et al showed incidence of 13.2%.[6,12-14] Incidence rose with increasing age (≤59 years, 4.2%), (60-69 years, 10.5%), (≥ 70 years, 16.0%) and was slightly (but not significantly) higher in women (11.0%) than in men (9.6%).

This study shows definite relationship between age and onset of atrial fibrillation in acute myocardial infarction Patients older than 60 years were prone to develop AF in AMI than younger patients (p = 0.0245). Similar correlation was observed by Siu et al showed that higher age is predictor of AF in AMI.[8] Kober et al in VALIANT study showed that patients with higher age are more susceptible for AF in AMI.[9] Similar findings were substantiated by Laurent et al in RICO study, Letho et al in OPTIMAAL study and Wong et al in GUSTO III study, Crenshaw et al in GUSTO I study and also by Goldberg et al.[6,10,12,14]

This study shows higher heart rate i.e. ≥100 is significant risk factor for new onset AF after AMI (p = 0.0033). Similar association was also proposed by Laurent et al in RICO study.[10] Wong et al in GUSTO III study, Crenshaw et al in GUSTO I study.[13,14]

In our study, 2 patients had stroke in hospital course who had new onset AF after AMI and 1 patient had stroke without AF (p = 0.0163). Patient with AF in setting of AMI are at more risk to encounter stroke. Data on AF-

associated stroke incidence in the population of AMI patients is available from only few investigations. For instance, the GUSTO-I trial with 40891 patients enrolled a significantly higher rate for in hospital stroke was documented for patients with AF after AMI.[14] The majority of strokes were ischemic strokes. During hospital stay, 3.1% of AMI patients with AF suffered from a stroke compared with only 1.3% of patients in sinus rhythm (P = 0.0001).

The complete data on the association between AMI, AF and stroke stems from the OPTIMAAL trial. New onset AF carried an adjusted hazard ratio for stroke of 14.6 (95% CI 5.87-36.3, P < 0.001) for the first 30 days after AMI.[12] In summary, there are persuasive data indicating that AF complicating AMI increases the risk for ischemic stroke during hospitalization. In this study 4 patients (50%) with AF after AMI were complicated by CHF in hospital course when compared to patients without AF, 7 patients (8%) had CHF (p = 0.0046). Patients who develop AF after AMI are more prone for CHF. Similar observation is also reported by Rathore et al. and Pedersen et al. in TRACE study.[1,15]

The depressed cardiac function was probably a major reason why patients with atrial fibrillation/-flutter more often developed congestive heart failure and cardiogenic shock during hospitalization than patients without the condition, and may be part of the reason for the increased susceptibility for the development of ventricular arrhythmias. Similar association was found by Kinjo et al.[7] In his study, significantly more in-hospital events (cardiogenic shock, congestive heart failure, ventricular tachycardia, and ventricular fibrillation) (P < 0.001) occurred in patients suffering from AF.

In this study 4 patients (50%) with AF were complicated by VF on the other hand only 7 patients (8%) without AF developed VF during hospital stay (p = 0.0046). Patients with AF after AMI are prone for VF. Similar association was found by Kinjo et al in his study significantly more in-hospital events (cardiogenic shock,congestive heart failure, ventricular tachycardia, and ventricular fibrillation) (P < 0.001) occurred in patients suffering from AF.[7] Similar observation is also reported by Rathore et al.[1] Similar association was also found by Pedersen et al. in TRACE study.[15]

CONCLUSION

On completion of the study it was concluded that, elderly patients aged 60 years and above are prone to have atrial fibrillation after acute myocardial infarction. Higher heart rate (>100 bpm) at time of presentation is a risk factor for AF following to AMI. Patients with new onset AF after AMI had more complication during hospital stay like stroke, VF, CHF. Patients with AF after AMI had higher in hospital mortality.

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