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Frequency of Arrhythmia after Acute Myocardial Infarction During Admission to the Coronary Care Unit in Ad_diwaniyah Teaching Hospital

Radhi F. Shlash[1], Sarah Abdul Kareem Abdul Jabbar[1]

[1]Al-Qadisiyah University/ College of Medicine, Iraq

Abstract

Aims of the Study:]To study the incidence of arrhythmias after Acute Myocardial Infarction (AMI) with respect to type of arrhythmia, risk factors , age and sex distribution, and location of infarction in a sample of patients during their admission in the coronary care unit in Ad Diwaniyah teaching hospital.

Patients and Method : This is a cross sectional study involving a cohort of 97 Iraqi patients diagnosed with acute myocardial infarction and admitted to the coronary care unit of Ad Diwaniyah teaching hospital in Ad Diwaniyah governorate / Iraq . All patients who admitted in the ccu for the period from January 2019 to july 2019 were followed by ECG records for any arrhythmia detected.

Result : Out of 97 patients diagnosed with AMI, 61 patients (62.88%) developed one type or more of arrhythmia, including 35 male (57.3%) and 26 female (42.6%), with the highest incidence (40.98%) above 70 years of age .

Reviewing the main risk factors in the past Medical History of those patients : hypertention was the most significant with 39 hypertensive patients (63.93%) .The types of arrhythmias found in the patients included in this study were 27 cases with Premature Ventricular Contraction (27.8% of all patients with AML), 13 cases of Atrial Fibrillation (13.4%), 18 cases of Sinus Tachycardia (18.5%), 7 cases of premature Atrial Contraction (7.2%) , 6 cases of Ventricular Tachycardia (6.2%) , 3 cases with Ventricular Fibrillation (3.09%), 3 cases of Sinus Bradycardia (3.09%), 5 cases with accelerated junctional rhythm (5.1%) , 3 cases of first degree A-V Block (3.09%), 2 cases with Complete Heart Block (2.06%) , 7 cases of Right Bundle Branch Block (7.2%) and 5 cases with Left Bundle Branch Block (5.11%)

Key words: *arrhythmia, acute myocardial infarction, coronary care unit*

Introduction

Acute myocardial infarction (AMI) is myocardial necrosis in a clinical setting consistent with acute myocardial ischemia and detection of elevated values of cardiac biomarkers (CK-MB/troponin-I) above the 99th centile of the upper reference limit 4 hours after starting of symptom [1]. Major risk factors for AMI can be classified as non _modifiable (e.g. genetic makeup) or modifiable (e.g. diet , cholesterol). In order to minimise the risk of AMI , modifiable risk factors should be identified and managed appropriately [2]. In practice, the disorder is diagnosed and assessed on the basis of clinical evaluation, the electrocardiogram (ECG), biochemical testing, invasive and noninvasive imaging, and pathological evaluation [3]. Diagnosis and treatment of patients with the hope of improving clinical outcomes depend on precise classification of infarction [(4,5)].In patients with myocardial infarction, 30-day mortality rates are between 7.8 - 11.4 percent (data reported by the American Heart Association in 2015) . Of these, 18% men and 23% women (>45 years of age) [6] . It is known that myocardial ischemia and infarction leads to severe metabolic and electrophysiological changes that induce silent or symptomatic life-threatening arrhythmias. Sudden cardiac death is most often attributed to this pathophysiology, Both atrial and ventricular arrhythmias may occur in the setting of ACS and sustained ventricular tachyarrhythmia's (VAs) may be associated with circulatory collapse and require immediate treatment.

Atrial fibrillation (AF) may also warrant urgent treatment when a fast ventricular rate is associated with hemodynamic deterioration [7]. The incidence of sustained VT and VF occurring within 48 h of the onset of an ACS seems to have decreased over the past decades [8-10]. This is most likely due to the widespread availability of revascularization therapy, limiting the size of infarction and to an increased use of beta-blockers [11]. However, in a recent retrospective analysis of two randomized trials sustained VA occurred in almost 6% of patients in the very early phase of acute MI indicating the significance of VT/VF in this situation[12].

Patients and Method

The study was designed to be a cross sectional study involving a cohort of 97 Iraqi patients diagnosed with acute myocardial infarction and admitted to the coronary care unit of Ad Diwaniyah teaching hospital in Ad Diwaniyah governorate / Iraq. Patients were selected randomly through their admission in the ccu for the period from January 2019 to july 2019 .ECGs used to follow the patients during their stay in the ccuto detect any arrhythmia and know the type of MI (STEMI or NSTEMI) and site of infarction .

The questionnaire form was based on the following:

• Sociodemographic characteristics of patients: Mainly age , gender and smoking .

• past medical history of the patients regarding hypertention , diabetes and previous ischemic heart disease

Data were collected, summarized, analyzed and presented using two software programs; these were the Statistical package for social sciences (SPSS) version 23 and Microsoft Office excel 2013. Numeric variables were presented as mean, standard deviation (SD) and range, whereas, categorical variables were expressed as number and percentage. Association between categorical variables was assessed using either Chi-Square test or Yates correction for continuity when more than 20% of cells have expected counts less than 5. The level of significance was considered at $P \leq 0.05$.

Results

Ninety seven patients admitted to the CCU with AMI included in this study: 57 of them were males (58.7%), and 40 of them were females (41.2%) , Their ages ranged from 23 to 90 years with the mean age of the participants was 62.5 (±16.54 SD) years (p value <0.01 HS). Age distribution of patients was (3.09%) in the age group 20-29 years, (5.15%) 30-39 years, (11.34%) 40–49 years, (18.56%) 50-59 years, (27.84%) 60-69 years and (34.02%) above 70 years as shown in **(Table 1).**

Table (1) Age and sex distribution of patients with Acute Myocardial Infarction

Age group	Gender		Total	%	P value
	Male	Female			
20-29	3	0	3	3.09%	0.01 HS
30-39	4	1	5	5.15%	
40-49	8	3	11	11.34%	
50-59	15	3	18	18.56%	
60-69	14	13	27	27.84%	
≥70	13	20	33	34.02%	
Total	57	40	97	100%	

Regarding the risk factors in the Medical History of those 97 patients, 61 Patients (62.8%) were hypertensive, 55 patients (56.70%) diabetic,38 patients (39.71%) were smoker, 31 cases of Ischemic Heart Disease (31.95%) , and 14 (14.43%) ex-smoker as shown in **(Table 2).**

Table (2). Risk factors for all cases with AMI.

Risk factors	Gender		Total	%	P value
	Male	Female			
HTN	33	28	61	62.88%	<0.001 ¥ HS
D.M	29	26	55	56.70%	
SMOKING	36	2	38	39.71%	
IHD	20	11	31	31.95%	
EX_ SMOKING	12	2	14	14.43%	

¥: Chi-square test; HS: highly significant difference at $P \leq 0.01$

Out of the 97 patients, 61 patients (62.88%) developed one type or more of arrhythmia, including 35 male (57.3%) and 26 female (42.6%), with age

distribution (0%) in the age group 20-29 , (4.92%) 30-39 years, (9.84%) 40-49 years, (16.39%) 50-59 years, (27.87%) 60-69 and (40.98%) above 70 years as shown in **(Table 3).**

Table (3) Age and sex distribution of patients with arrhythmia following Acute Myocardial Infarction

Age group	Gender		Total	%	P value
	Male	Female			
20-29	0	0	0	0	0.217¥ NS
30-39	2	1	3	4.92%	
40-49	5	1	6	9.84%	
50-59	8	2	10	16.39%	
60-69	9	8	17	27.87%	
≥70	11	14	25	40.98%	
Total	35	26	61	100%	

; ¥: Chi-square test; NS: not significant at P ≤ 0.05

Reviewing the main risk factors in the past Medical History of the 61 patients who developed arrhythmia following AMI, regarding Hypertension , diabetes , IHD and smoking, the results were as the following for both sexes, 39 hypertensive (63.93%) , 32 diabetic (52.45%), 20 cases with previous history of IHD (32.78%), 20 (32.78%) smokers, and 6 (9.83%) ex-smokers as shown in **(Table 4, Figure 3).**

Table (4) Risk factors of 61 cases with AMI who had developed Arrhythmia.

Risk factors	Gender		Total	%	P VALUE
	Male	Female			
HTN	21	18	39	63.93%	0.047 ¥ S
D.M	18	14	32	52.45	
SMOKING	19	1	20	32.78%	
IHD	13	7	20	32.78%	
EX_ SMOKING	6	0	6	9.83%	

; ¥: Chi-square test; HS: highly significant difference at P ≤ 0.01; NS: not significant at P ≤ 0.05

Studying the site of infarction for cases with AMI demonstrated that there are 12 patients with Anterior MI 8 of them developed Arrhythmia (66.6%), 15 patients with Anteroseptal MI 11 patients of them developed arrhythmia (73.33%), 8 patients with Anterolateral MI (5 of them had arrhythmia 62.5%), 5 patients with septal MI , 2 of them developed arrhythmia (40%), 13 patients with Inferior MI (10 of them developed arrhythmia 76.92%), 9 patients with extensive MI (including 8 patients with arrhythmia 88.8%) and 29 patients with NSTEMI (including 12 patients with arrhythmia 41.3%) and no case recorded with posterior MI AS shown in **(Table 5).**

Table (5) Distribution of patients according to the site of infarction.

Site of Infarction	Total Number of MI Patients	Ptswho developed Arrhythmia	Percentage	P VALUE
Anterior	12	8	66.66%	0.9 NS
Anteroseptal	15	11	73.33%	
Anterolateral	8	5	62.5%	
septal	5	2	40%	
Inferior	13	10	76.92%	
inferolateral	7	4	57.14%	
Posterior	0	0	0%	
Extensive	8	8	100%	
NSTEMI	29	13	44.82%	
Total	97	61	62.88%	

The types of arrhythmias found in the patients included in this study were as the following: 27 cases with Premature Ventricular Contraction (27.8% of all patients with AML), 13 cases of Atrial Fibrillation (13.4%), 18 cases of Sinus Tachycardia (18.5%), 7 cases of premature Atrial Contraction (7.2%) , 6 cases of Ventricular Tachycardia (6.2%) , 3 cases with Ventricular Fibrillation (3.09%), 3 cases of Sinus Bradycardia (3.09%), 5 cases with accelerated junctional rhythm (5.1%) , 3 cases of first degree A-V Block

(3.09%), 2 cases with Complete Heart Block (2.06%) , 7 cases of Right Bundle Branch Block (7.2%) and 5 cases with Left Bundle Branch Block (5.11%) as in **(Table 6, Figure 4).**

Table (6) Frequency and percentages of Arrhythmias recorded in patients with AMI.

Type of Arrhythmia	Number	Percentage out of the 61 Patients who developed arrhythmia	Percentage out of the Total Number of Patients with AMI
P V C	27	44.2%	27,8%
AF	13	21.3%	13.4%
Sinus Tachycardia	18	29.5%	18.5%
PAC	7	11.4%	7.2%
V T	6	9.8%	6.1%
VF	3	4.9%	3.09%
Sinus Bradycardia	3	4.9%	3.09%
AiVR	5	8.1%	5.1%
1st AV Block	3	4.9%	3.09%
3rd AV Block	2	3.2%	2.06%
RBBB	7	11.4%	7.2%
LBBB	5	8.1%	5.11%

Discussion

This study included 97 Patients admitted with AMI , 57 (58.7%), males patients and 40 (41.2%) females patients , so there is a clear male predominance . Acharya LD et al, also reported similar findings in accordance with the findings of this study [13]. Siddique MB et al, also observed males (67%) predominance over the females (33%) [14]. Overall incidence of myocardial infarction in this study was more common with the age group above 70 years (34.02%). Deshpande JD et al, in their study observed that, the incidence of AMI was highest i.e. 31% among the study subjects with 51 to 60 years [17] Regarding risk factors In this study, we have concentrated on four main risk factors (Diabetes Mellitus, Hypertension , IHD and smoking) for precipitating AMI and its arrhythmic complications , Hypertension was a major risk factor for 62.88% of overall patients with AMI and 63.93% of those who developed arrhythmia following AMI , it is well known that uncontrolled and prolonged elevation of BP can lead to a variety of changes in the myocardial structure, coronary vasculature, and conduction system of the heart [18] . The second significant risk factor was DM , 55 patients (56.70%) of the total number of cases were diabetic and 32 patients (52.45%) of them developed arrhythmia , since. Diabetes causes endothelial dysfunction, decreases endothelial thromboresistance, and increases platelet activity, thus accelerating atherosclerosis [19,20]. Because there is a strong association between cigarette smoke exposure and heart disease , in the present study out of all AMI cases 38 patients (39.71%) were smoker, 14 (14.43%) ex-smoker , because Nicotine in Cigarette smoke produces a marked elevation in serum catecholamine concentration that is potentially arrhythmogenic [22], smoking was found in 32.78% of patients and EX smoking 9.83% of A MI patients who develop arrhythmia. The maximum incidence (40.98%) of arrhythmias in this study was found in patients above 70 years of age (despite of p value 0.217 which is not significant statistically).The results of the study were in accordance with those of the American Heart Association, which showed 42% in age group of 60 or more [27]. This is due to high prevalence of DM, dyslipidemia, atherosclerosis in age group of 60 or more. According to gender wise distribution incidence was more in males (57%) as compared to females (42%).

Conclusion

The frequency of arrhythmias and particularly premature ventricular contractions and sinus tachycardia following acute myocardial infarction was significantly high in this study patients sample. Increasing with age in both sexes. More common in extensive infarctions, while Hypertension ,Diabetes Mellitus, previous ischemic heart disease and smoking are the commonest associated risk.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Al-Qadisiyah University/ College of Medicine and all experiments were carried

out in accordance with approved guidelines.

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