Clinical Profile of Patients Presenting with Acute Myocardial Infarction in United Arab Emirates: A Tertiary Care Center Government Hospital Experience

Sadeq Tabatabai Nooshin Bazargani Jasem Mohammed Al Hashmi

Cardiology Department, Dubai Hospital, Dubai Health Authority, Dubai, UAE

Keywords

Myocardial infarction · Reperfusion therapy · Percutaneous coronary intervention · Acute coronary syndrome · Cardiology

Abstract

Background: Acute myocardial infarction (AMI) is one of the major causes of hospitalization and mortality worldwide. There has been limited data available to characterize AMI presentation, contemporary patterns of medical care, and outcomes in Dubai, United Arab Emirates. **Methods:** A single-center observational registry for patients with AMI was used. All patients admitted to Dubai Hospital with AMI (ST elevation and non-ST elevation) with positive troponin from the mid of August 2017 till the end of April 2018 were included in this registry. Clinical data, prior history, demographics, treatments, and outcomes were recorded from the patient's electronic medical file of the hospital. **Result:** A total of 329 patients (male 92%, mean age 53.6 years) were included in our registry. The use of ambulance service was only

25%. Electrocardiogram findings of ST-segment elevation myocardial infarction (STEMI) were found in 57% and non-STEMI in 43%. History of prior ischemic heart disease was present in 21% of all cohort, diabetes in 36%, hypertension in 38%, and the current smoking rate was 35%. Reperfusion therapy was provided to 94% of the patients with STEMI; only 32% of them had primary angioplasty, and medical reperfusion was performed in 68%. One-third of them received thrombolysis within 30 min, and primary percutaneous coronary intervention (PCI) was provided to 38% within 90 min. All the patients received aspirin and adenosine diphosphate inhibitors within the first 24 h. The majority of the patients received other key medicines like beta-blocker, statin, and anticoagulant agents within 24 h. The in-hospital mortality rate was about 3%. **Conclusions:** Using data from the registry may provide an overview of the current status of AMI in Dubai. Medical reperfusion therapy is the most common reperfusion modality in our center, and this will raise the question of whether we need to launch a 24-h primary PCI program in our center.

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Introduction

Although acute myocardial infarction (AMI) is one of the leading causes of mortality and one of the major challenges facing the health-care system in the world, there is still a lack of data on the characteristics of patients with AMI in Dubai. In 2010, acute coronary syndrome (ACS) registry from 4 large centers in the United Arab Emirates (UAE-ACS Registry) including patients from Dubai and Rashid Hospital was published. The published data from the UAE-ACS Registry have revealed different characteristics than those from western AMI registries [1].

Carrying the highest mortality rates worldwide, AMI requires special approaches for systematic documentation of occurrence rates and changing trends over time. Using data from the Dubai Hospital AMI registry, we provide an overview of the current status of AMI in Dubai.

The Dubai Hospital AMI registry is a single-center observational registry of patients with AMI admitted to the cardiology unit at Dubai Hospital. This registry presents to the decision-makers and physicians in the real-world clinical field access to the demographic characteristics, risk factors, medications, treatment strategies, and clinical outcomes of patients with AMI. Furthermore, it will provide evidence for the quality of care and the degree of adherence to the international guidelines in the management of AMI derived from the results of clinical trials that have been applied in the clinical practice in our center.

The significant improvement in outcomes is concurrent with the translation and integration of evidence-based AMI care including early myocardial reperfusion, effective antithrombotic therapy, and intensive evidence-based medication into routine clinical practice [2, 3].

Method and Material

Our study is a single-center observational registry of patients with AMI who were admitted to cardiology unit at Dubai Hospital from the mid of August 2017 till the end of April 2018. We included all patients who presented with clinical evidence of AMI characterized by elevation of high sensitive cardiac troponin T associated with at least one of the following:

1. Symptoms compatible with myocardial ischemia.
2. Development of new abnormal Q waves.
3. ST-T changes are compatible with myocardial ischemia (ST-segment elevation or depression, T-wave inversion).

ST-segment elevation myocardial infarction (STEMI) was diagnosed when ST elevation >1 mm was seen in at least 2 contiguous leads in any location on the index or qualifying electrocardiogram (ECG), or when presumed new left bundle branch block or documented new Q waves were observed. In the absence of ST-segment

Table 1. Baseline demographic and clinical characteristics of registry cohort

Baseline clinical characteristics	Total (n = 329)
Demographic	
Age, mean, years	53.6±12
Male gender	301 (92)
Weight, mean, kg	76±13
Height, mean, cm	167±8
Past IHD	
Prior myocardial infarction	26 (8)
Prior PCI	39 (12)
Prior CABG surgery	5 (2)
Past medical history	
Diabetes mellitus	120 (36)
Current smoker	115 (35)
Atrial fibrillation	5 (2)
Hypertension	126 (38)
Hyperlipidemia	41 (13)
Dialysis	3 (1)
Cancer	3 (1)
Stroke	6 (2)
Heart failure	2 (1)
Means of transportation	
Ambulance	82 (25)
Family/Friend	247 (75)
Type of myocardial infarction	
NSTEMI	142 (43)
STEMI/LBBB	187 (57)

Data are mean±SD or number (%). PCI, percutaneous coronary intervention; IHD, ischemic heart disease; CABG, coronary artery bypass grafting; STEMI, ST-elevation myocardial infarction; NSTEMI, non-ST-elevation myocardial infarction; LBBB, left bundle branch block.

elevation, patients meeting the inclusion criteria were considered to have non-ST elevation myocardial infarction (NSTEMI). Data were collected from the patient's electronic medical record.

Cardiovascular and noncardiovascular past medical history, risk factors, baseline ECG, patient's demography, baseline clinical course, therapeutic management in the prehospital setting, during the hospital stay, and at discharge were recorded. Left ventricular ejection fraction (LVEF) when assessed at any time during the hospital stay was recorded. Routine laboratory results on admission were collected. In-hospital complications and outcomes specifically information on the occurrence of reinfarction, myocardial revascularization, heart failure, stroke, bleeding events, cardiac arrest, and death were recorded.

Statistical Analysis

The categorical variables are presented as count and percentages (%), while the numerical variables are presented as mean ± standard deviations if it is bell shaped and median [interquartile range] if it is skewed.

Table 2. Patient's characteristics at presentation

Characteristics at presentation	Total (n = 329)
Vital signs at presentation	
Systolic blood pressure, mean	148±28
Heart rate, mean	84±22
Clinical presentation	
Heart failure	20 (6)
Cardiogenic shock	5 (2)
Cardiac arrest	18 (5)
ECG at presentation	
ST elevation	186 (57)
New or presumed new ST depression	39 (12)
New or presumed new T-wave inversion	58 (18)
LBBB	1 (<1)
Normal	16 (5)
Transient ST elevation lasting <20 min	9 (3)
Others	19 (6)

Data are mean±SD, or number (%). ECG, electrocardiogram; LBBB, left bundle branch block.

Results

Patients' Characteristics

During the period of the study, our cohort included 329 patients with a final diagnosis of AMI. The demographic details and baseline characteristics are presented in Table 1. The average age was 53.6 ± 12 years, and females were the minority and accounted for around 8% of the cohort. Nationals from the Indian subcontinent (India, Pakistan, and Bangladesh) were found in 232 patients (70%) of the cohort population. Previous history of ischemic heart disease was found in 70 patients (21%). History of percutaneous coronary intervention (PCI) was found in 12% of the patients while 8% of the patients had a history of previous myocardial infarction.

The most frequent risk factors were hypertension (38%) and diabetes mellitus (36%), and the current smoking rate was 35%. A minority of the patient had a history of atrial fibrillation, cancer, and heart failure, and only 3 patients were on regular hemodialysis. Most of the patients arrived at the emergency department (ED) with their own transportation, and ambulances were used in only 25% of the patients. At presentation, evidence of acute STEMI was found in 57% while 43% of the patients presented with acute NSTEMI.

Clinical Findings at Presentation

On arrival, 20 patients (6%) had signs of heart failure, 5 patients (2%) had a cardiogenic shock, and 18 patients

Table 3. Management practice during in-hospital encounter

Management practice	
Door-to-ECG time, min	
Mean	9±1
Median	6 [4, 8]
DTN time, min	
Mean	56±48
Median	39 [26, 67]
DTB time, min	
Mean	115±50
Median	102 [72, 149]

Data are mean ± SD or median [IQR]. ECG, electrocardiogram; DTN, door-to-needle; DTB, door-to-balloon.

Fig. 1. Reperfusion therapy for the patients who were presented with STEMI. STEMI, ST-segment elevation myocardial infarction.

(5%) had a cardiac arrest on arrival, four of them had cardiac arrest prehospital (Table 2).

Among patients with acute NSTEMI (142 patients), the ECG changes of T wave were the most frequent (58 patients) while ST depression was found in 39 patients. Nine patients had transient ST elevation at the time of presentation. Normal ECG was seen in 16 patients (Table 2).

Reperfusion Therapy for STEMI

In general, the entire cohort had ECG done in the ED. Mean door-to-ECG time was 9 ± 1 min, and the median was 6[4,8] min (Table 3).

Among patients who presented with ECG evidence of acute STEMI (187 patients), 176 patients (94%) received a form of reperfusion therapy and 11 patients (6%) did not receive reperfusion therapy (Fig. 1). Symptom onset of >12 h from the presentation time (10 patients) was the

Table 4. In-hospital and discharge pharmacological and intervention treatments

Pharmacological and interventional treatments	Total (n = 329)
Treatment during hospital stay	
ACE inhibitor	186 (57)
ARB	26 (8)
Beta-blocker	293 (89)
Aspirin	329 (100)
Clopidogrel	311 (95)
Ticagrelor	30 (9)
Heparin (unfractionated)	217 (66)
Heparin (low molecular weight)	269 (82)
Statin	309 (94)
Glycoprotein IIB/IIIA inhibitor	103 (31)
Treatment at discharge	
ACE inhibitor	200 (65)
ARB	28 (9)
Beta-blocker	292 (94)
Aspirin	305 (98)
Clopidogrel	226 (73)
Ticagrelor	74 (24)
Oral anticoagulation	7 (2)
Statin	306 (99)
Other lipid-lowering agents	7 (2)
Preadmission intervention	
Exercise stress test	0
Echocardiogram	297 (90)
<30%	19 (6)
30–39%	65 (22)
40–50%	133 (45)
>50%	80 (27)
Coronary angiogram	261 (79)
Coronary angioplasty	202 (62)
CABG	4 (1)

Data are number (%). ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CABG, coronary artery bypass grafting.

main reason for which patients did not receive reperfusion therapy.

Medical reperfusion therapy with tenecteplase was the most frequent reperfusion strategy used (68%) (Fig. 1). The mean door-to-needle (DTN) time was 56 ± 48 min, and the median was 39 [26, 67] min (Table 3). Only 35% of the patients received thrombolytic therapy within 30 min, and 38% of the patient underwent primary PCI within 90 min.

Fig. 1 shows that mechanical reperfusion therapy with primary PCI was performed in one-third of the patients presented to the ED with acute STEMI. Actually, 3 patients found to have 3-vessel disease underwent coronary artery bypass grafting (CABG) surgery and 2 patients

Table 5. Main indications for coronary intervention

Indications for PCI	Total (n = 202)
PCI for NSTEMI	73 (36)
PCI for STEMI (stable after successful full-dose lytic)	55 (27)
PCI for STEMI (stable, >12 h from symptom onset)	8 (4)
Primary PCI for STEMI	52 (25)
Rescue PCI (after failed full-dose lytic)	14 (7)

Data are number (%). PCI, percutaneous coronary intervention; STEMI, ST-elevation myocardial infarction; NSTEMI, non-ST-elevation myocardial infarction.

were found to have spontaneous reperfusion. The average door-to-balloon (DTB) time was 115 ± 50 min, and the median was 102 [72, 149] min (Table 3).

In-Hospital Management

Concerning in-hospital medical therapy and intervention, a great proportion of patients received evidence-based medications during their hospitalization and at discharge in our cohort (Table 4). All the patients received aspirin and adenosine diphosphate (ADP) receptor inhibitors (clopidogrel or ticagrelor) within the first 24 h. The majority of the patients received beta-blocker (89%) and statin therapy (94%) within the first 24 h. Anticoagulants were administered in 325 patients (99%) and only 4 patients did not receive anticoagulants. The predominant anticoagulant drug used is low molecular weight heparin, namely, enoxaparin (82%), while unfractionated heparin was used predominantly during coronary intervention as bolus doses. Only, 10 patients received unfractionated heparin in form of intravenous infusion.

Glycoprotein IIB/IIIA inhibitor was administered in 103 patients (31%), and the only one used is tirofiban. Out of 142 patients with acute NSTEMI, only 27 patients (19%) received tirofiban, while out of 187 patients with acute STEMI, 76 patients (41%) received tirofiban. Table 4 shows that 297 patients (90%) had their LVEF assessed by echocardiogram before hospital discharge and the majority were having a mild reduction in LVEF (45%). Coronary angiogram was performed in 261 patients (79%), and the main reason why coronary angiogram was not done is patient refusal (55 patients, 17%). Coronary angioplasty was performed in 202 patients (62%) out of 329 patients, and the reasons for PCI are shown in Table 5. Radial access was used in the majority of the patients who had coronary angioplasty (122 patients, 60%).

Four patients underwent CABG before hospital discharge; three of them were admitted with acute STEMI (Table 4).

A record of discharged medication is available for 310 patients (10 patients were discharged against medical advice and 9 patients died; their discharge medications were not recorded). Only 5 patients were discharged without aspirin, and 300 patients (97%) were discharged on ADP inhibitors, most of them on clopidogrel (74%). A good portion of the patients were discharged on ACE inhibitors/angiotensin receptor blockers. Statin therapy was used in 99% of the patients at the time of discharge, and only 11 patients (4%) were on low-intensity statin therapy (Table 4).

In-Hospital Complications and Mortality

In-hospital complications were not so common in our registry cohort: heart failure 7%, cardiogenic shock 3%, ventricular tachycardia/fibrillation 5%, atrial fibrillation 2%, and 21 patients (6%) had cardiac arrest. Few patients required intra-aortic balloon pump insertion, and 5 patients (2%) required hemodialysis. No stroke was reported. Five patients received blood transfusion; two of them underwent CABG. One patient developed retroperitoneal bleeding. The in-hospital death rate was about 3% (Table 6).

Discussion

ACS registries are considered one of the national quality control projects and can be used as a quality indicator for the management of patients with AMI. The previous studies in UAE showed that the average age of the patients with ACS was 51 years and patients with acute STEMI was 47 years [1, 4]. Our study confirmed these findings that patients with AMI in UAE are probably the youngest patients worldwide. In comparison to the other gulf countries, the average age of the patients with ACS in Qatar was 54 years; Kuwait, 55 years; Saudi Arabia, 61 years; and Oman, 58 years [5–8]. Compare to the developed countries, the average age of the patients with AMI in Europe was found to be about 66 years [9]. Other striking findings are that our patients are predominantly males (92%) compare to Europe (69%) and probably that is due to most of the patients in UAE are expatriates (93%) and most of them are male workers [1, 9].

The rate of major risk factors like diabetes mellitus, hypertension, and current smoking was different from those found in other regional and international registries. One-third of our patients were diabetic compare to 48% in Ku-

Table 6. In-hospital complications and outcome

Complications and outcomes	Total (n = 329)
Heart failure	23 (7)
Cardiogenic shock	9 (3)
Intra-aortic balloon pump	3 (1)
Dialysis	5 (2)
Bleeding	1 (<1)
Blood transfusion	5 (2)
Stroke	0
Atrial fibrillation	5 (2)
Ventricular tachycardia/Fibrillation	16 (5)
Cardiac arrest	21 (6)
Reinfarction	3 (1)
Death	9 (3)

Data are number (%).

wait, 41% in Qatar, and one-fourth in Europe [5, 6, 9]. The UAE-ACS Registry showed that the rate of diabetes mellitus was 39%, and it was 28% in patients with acute STEMI in UAE [1, 4]. The rate of hypertension was relatively low in our cohort (38%), while the rate of hypertension in Kuwait and Qatar was 49 and 41%, respectively [5, 6]. While in Europe, the rate of hypertension was 58% in patients with ST elevation and 65% in patients with non-ST elevation ACS [9]. The smoking rate among patients with ACS in Kuwait was 40%, and 33% of the patients with ACS were smokers in Qatar [5, 6]. While in Europe, the rate of smoking was 37% in patients with ST elevation and 24.5% in patients with non-ST elevation ACS [9]. Despite our patients being relatively young, about one-fifth of them reported a previous history of ischemic heart disease.

More than half of our patients were presented with ECG changes suggestive of STEMI compare to about 60% in Europe [9]. Only 82 (25%) patients arrived at the hospital by ambulance compare to 17.3% in the previous registry [1]. Although this survey shows evidence of improvement in utilizing ambulance service in the UAE, we believe that we should intensify the public awareness about symptoms and signs of ACS in the society, and the use of ambulance services in case of chest pain should be encouraged.

The use of key medicine like aspirin, ADP inhibitors, beta-blockers, ACE inhibitors/angiotensin receptor blockers, and statin was comparable to what was reported in Europe [9]. The different socioeconomic classes between expatriates (70% from the Indian subcontinent) and the UAE nationals did not prevent them from receiving reperfusion therapy and other key medications unlike

what has been shown in India for example [10]. However, follow-up treatment could be different as patients do not receive this free of charge.

This registry showed that the medical reperfusion therapy with tenecteplase is the main reperfusion strategy in our center, and only 32% of the patients with STEMI underwent primary PCI. Yet, DTN and DTB time is not optimal as recommended by international guidelines like American Heart Association and European Society of Cardiology [11, 12]. On the other hand, this survey showed that the majority of the patients with STEMI had a form of reperfusion therapy, and despite improvements in the rate of primary PCI compared to the previous UAE-ACS Registry (17%), the rate of primary PCI is still very low among our patients [1]. This will raise the question of whether we need to launch a 24-h primary PCI program in our center. Measures need to be taken to improve DTB and DTN time in our center.

Overall in-hospital morbidity and mortality rate are relatively low. The rate of death among patients with ACS in Kuwait was 2.7%, while in Saudi Arabia, Oman, and Europe were 4.5, 4.3, and 6.3% respectively [6–9]. The in-hospital mortality rate of patients with ACS in India was found to be 6.7% [10]. Our patients were quite young, a feature likely to contribute to the low mortality rate.

Limitations

This study is a single-center experience on the management of AMI patients in form of STEMI and NSTEMI in Dubai, United Arab Emirates. The number of patients is relatively small, and the follow-up mortality and morbidity data post patients' discharge are not available.

Conclusion

Overall, this registry may provide an overview of the current status of AMI presentation, management, and clinical outcomes in Dubai. The majority of our patients

attended for medical attention on their own rather than by ambulance. This shows the need to improve public awareness regarding using ambulance service in case of chest pain. The in-hospital morbidity and mortality are low, but unfortunately, we do not know their 30 days and longer mortality and morbidity data. This study showed that the primary PCI is not the main reperfusion therapy in our center, and measures need to be taken for improvements.

Statement of Ethics

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Dubai Health Authority (DHA) Ethics Committee. The approval details are as follows: 1) Medical Research Committee: MRC 06/2013_15 dated Feb 24, 2014; 2) Dubai Scientific Research Ethics Committee (DSREC), extended approval: DSREC 07/2017_06 dated Aug 1, 2017.

Conflict of Interest Statement

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Author Contributions

All the authors contributed equally in writing the manuscript. All authors read and approved the final manuscript.

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