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Clinical Presentation, management, and outcomes of ST-Segment Elevation Myocardial Infarction in the Cardiac Center, Al-Thawra hospital- Sana'a city-Yemen

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Abstract

Background and aim: Acute ST-segment elevation myocardial infarction (STEMI) is a critical medical emergency requiring emergency evaluation, diagnosis, and intervention. The aim of the study was to evaluate the clinical presentation, type of treatment, and outcomes of patients with acute ST-segment elevation myocardial infarction at the Heart Center of Al-Thawra Hospital, Sana'a.

Methods: prospective study. We enrolled all patients with a final diagnosis of STEMI who have been admitted to the cardiac CCU in the cardiac center in AL-Thawrah Hospital during one year, January to December 2023.

Results:A total of 358 patients with STEMI were analyzed. The mean age was 55 ± 8 years old, with male patients representing 80% (286)). The traditional risk factors among these patients were: hypertension 28.23% (101), smoking represents 26.05% (93), diabetes mellitus represents 19% (68), BMI > 30 kg/m2 represents 16.34% (57), and khat chewing represents 78.2% (279). STEMI patients who managed by primary PCI were 14% (50). Patients who have been managed by thrombolytic therapy were 28% (101) and the conventional medical treatment was managed for those who arrived after 12 hours and represent 58% (204). The most commonly used thrombolytic was streptokinase in 96% (97) of patients who received thrombolytics. Primary PCI within 24 hours has been done in 14% (50) of cases. Heart failure (EF < 50%) represented (26%) (93), cardiovascular shock was 13% (46 cases), and mortality rate was 11% (39 cases).

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1. INTRODUCTION

Myocardial infarction (MI) has a wide spectrum of clinical manifestations that may range from asymptomatic to atypical manifestations such as dizziness and hiccups. However, chest pain is the most common symptom [1]. The diagnosis of myocardial infarction (MI) is related to the release of cTn and is based on the fourth universal definition of MI. The resting 12-lead ECG is the first-line diagnostic tool in the assessment of patients with suspected ACS. It is recommended that an ECG be obtained immediately upon FMC and interpreted by a qualified emergency medical technician or physician within 10 minutes [2, 3]. Several risk factors have been implicated in the etiology of coronary artery disease (CAD): diabetes mellitus, HTN, smoking fast and fatty foods, and a lack of physical exercise [4, 5, 6]. The prevalence of AMI in low- to middle-income countries is rising rapidly [7]. The main strategy of management is to restore blood flow in coronary arteries as early as 90 minutes of first medical contact. PPCI is superior to fibrinolysis in revasculrization and reducing mortality, non-fatal reinfarction, and stroke [8]. For patients who undergo fibrinolysis, rescue PCI is indicated if fibrin¬olysis fails (i.e., ST-segment resolution <50% within 60–90 min of fibrinolytic adminis-

tration) or in the presence of hemodynamic or electrical instability, worsening ischaemia, or persistent chest pain [9, 10]. Patients with successful fibrinolysis should undergo early invasive angiography (i.e., within 2–24 h from the time of the lytic bolus injection) [11]. The aim of the study was to evaluate the clinical presentation, type of treatment, and outcomes of patients with acute ST-segment elevation myocardial infarction at the Heart Center of Al-Thawra Hospital, Sana'a.

2. METHODS

All prospective patients with acute STEMI were enrolled from the cardiac CCU between January and December of 2023. Demographic characteristics, medical history, final diagnosis, different laboratory investigations, in-hospital management, and outcomes were collected using case report forms. Filling of these case report forms was initiated upon admission with a final diagnosis of acute STEMI, and verified cardiologists or research assistants filled these forms. The diagnosis of MI was based on the American College of Cardiology clinical data standards [12]. Diabetes mellitus was defined as having a history of diabetes mellitus, on current diabetes treatments, or having blood glucose of more than or equal to 7 mmol/L. Dyslipidemia was defined as the presence of elevation of plasma cholesterol, triglycerides, or both, or patients being treated with lipid-lowering agents. The definition of hypertension was having a history of hypertension diagnosed and treated with medications or lifestyle modifications, a systolic blood pressure of > 140 mmHg, or a diastolic blood pressure > 90 mmHg on at least two occasions, or being treated with any antihypertensive medications.

3. STATISTICAL ANALYSIS

Continuous variables were reported in means (standard deviation) or as median and interquartile range (IQR) when skewed. Categorical variables were reported as percentages and compared using the 2 test. Continuous variables were compared by the Mann-Whitney U test. The Kruskal-Wallis test was used when more than two groups were compared. A p value of < 0.05 was considered statistically significant. All tests were two-sided. Data was analyzed using IBM SPSS statistics for Windows version 23. Armonk, NY, IBM Corp.

4. RESULTS

358 patients with myocardial infarction were enrolled between January and December 2023. Table 1 shows the characteristics of the patients. The mean age was 55 ± 8 years. Males represented the majority of the patients with 80% (286), and only 6% of the patients were 75 years of age or older, while 18% (64) were younger than 40 years. Typical chest pain was the main symptom among the patients and represented 85.47% (306), atypical chest pain represented 8.1% (29), dyspnea represented 6% (23), syncope 0.9% (3), cardiac arrest 0.9 (3), and palpitations 0.9% (3).

Table 1. Clinical characteristics, management and outcome of the whole group

Variables	N (%)
Total number of patients	358 (100%)
Mean Age	55 y (Sd± 8 Y)
Male	286(80%)
Female	72 (20%)
Typical ischemic chest pain	304 (84%)
Atypical chest pain	53(14%)
Medical history	
Peripheral arterial disease	4(1.07%)
Chronic renal failure	1(0.5%)
Risk factors	
Diabetes mellitus	68(19%)
Hyperlipidemia	54(15%)
Hypertension	100(28%)
Current Smoking	146(41%)
Never smoked	85 (24%)
Ex-smoker	82(23%)
Khat chewers	279(78%)
Out comes	
Low EF	193 (53%)
Cardiogenic shock	46(13%)
Mortality	39(11%)

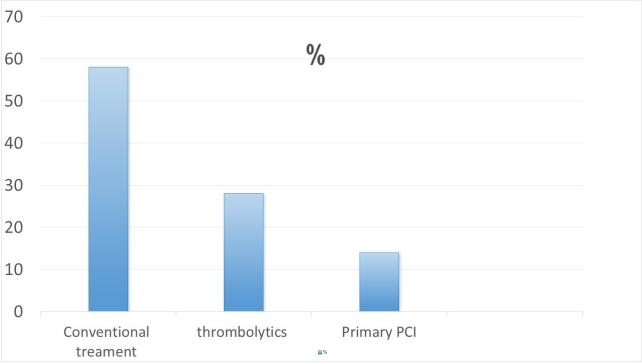

Figure 1. Types of STEMI management

Medical history of myocardial infarction represents 7.3% (26), chronic heart failure 0.3% (one case),stroke/transient ischemic attack (TIA) 3.21% (3), percutaneous coronary intervention (PCI) 2.10% (7), coronary artery bypass graft (CABG) 0.30% (1), atrial fibrillation 0.90% (3), and peripheral vascular disease 1.07% (4). The prevalence of traditional risk factors such as current smoking was 41.05% (146)„ diabetes mellitus 19% (68), BMI 30 kg/m 16.34% (557) , hypertension

28.23% (100), khat chewing 77.2% (279), chronic renal disease, and peripheral arterial disease. The main way to transfer patients to hospitals was for families to present their patients. 98.% (326), The ambulance services transfer patients from non-PCI-facilitated hospitals to facilitated hospitals. 2% (5%)) of patients to the ER.. Patients who arrived within 2 hours of the symptoms onset were 9.7% (35) and those who arrived within 12 hours were 39% (139), and those who arrived within 24 hours were 51.3% (184). Primary PCI was performed for 14% (50) patients, thrombolytics in 28% (100), and conventional medical treatment in 58% (207). Thrombolytics were given in the CCU/ICU rather than EMS or ER in 94.26% (94). The most commonly used thrombolytic is streptokinase in 96%% The successful rate of revascularization of 30% (33%(33) was assessed by resolving of chest pain and regression of more than 50% in ST-segment elevation in ECG and detection of arrhythmia. The most common cause of not giving thrombolytics is a late presentation of more than 12 hours (51% (184). Cardiogenic shock has been seen in 13% (46) of our patients, while the mortality rate was 11% (39). In hospital medications were unfractionated heparin in 84.19%, low molecular weight heparin in 9.6%, aspirin at 87.6%, clopidogrel at 81.07%, statins at 86.43%, beta-blockers at 67.8%, ACE inhibitors at 73.7%, and ARBs in 7.0%.

5. DISCUSSION

Acute MI in Yemen is increasing sharply in recent years due to change of life style , moderation of the large cities. We conducted this study to document the clinical picture and way of management in our cardiac center. We enrolled 385 patients during one-year time with a mean age of 55 ± 8 years vs. 62.9 ± 12.4 years; p-value < 0.001. This observation has been reported repeatedly in many previous studies [13]. In comparison to studies on patients in Malaysia, India, and Egypt, the prevalence of hypertension, family history, lack of exercise in the young, and obesity in all patients was greater in Yemeni patients [14]. The prevalence of hypertension is higher in India, and therefore more young patients have a greater proportion of hypertension compared to Malaysian patients. In terms of the prevalence of dyslipidemia, Malaysian patients had the highest prevalence. Therefore, young patients had a greater frequency of dyslipidemia compared to patients in the other three countries. However, the distribution of hypertensive patients differed between the sexes, with males being more prone to hypertension [13]. Khat chewing is a major risk factor for acute MI in Yemeni patients and is going to cause severe coronary spasm [14]. Khat (Catha edulis Forsk) is a phytopharmaceutical stimulant substance largely consumed in East Africa and Middle East countries. Khat is habitually used by chewing the green leaves over a long period of time (typically a few hours per day) [15, 14]. It was used by students to remain awake for long hours to revise for exams, by truck drivers to stay alert during prolonged trips, by forces involved in Yemen and some other Middle East countries in the early 1960s during insurgency operations, and it is also popular in social gatherings and meetings. Its role in religious activities of Muslims is documented [16]. In our study, khat is a unique risk factor that has been noted in 78.2% vs. 33 Ethiopians [**p**]atients with STEMI. This result is similar to other studies that investigate khat as an independent risk factor of STEMI [14, 17]. Ambulance service is not available in Yemen; this explains why 92% of our patients had arrived at the hospital by his/her family. This fact may be one of the reasons for the delay in presentation to the hospital among our patients, where the median time in minutes for symptoms onset and first medical contact was 780 minutes vs. 100 minutes in European studies [18]. In this study, of about 149 (14%) STEMI patients treated with PCI, the mean time of pain to FMC was 420 min. Poverty, unawareness of STEMI symptoms, absence of ambulance service, and lack of medical assurance are major reasons for delayed presentation. Adoption of a national plan for increasing patient adherence, providing hospitals with PCI facilities, establishing an emergency center for connecting hospitals with PCI facilities, and activation of ambulance service shows in many reports to improve the FMC to wire timing [19]. In our study, among patients with ST elevation, 28% received streptokinase, while only 14% were referred for primary PCI. This result is similar to the previous result in Yemen, where about 135 (41%) underwent thrombolytic therapy by streptokinase, which is cheap and available in Yemen at that time, and about 12 (3.65%) by PPCI. Similar results were observed in the Egyptian National Heart Institute Registry [20]. In a more recent registry, the rate of primary PCI among STEMI patients was 37% and thrombolysis in 54.7% [21]. The ACCESS registry is a comprehensive multinational registry that observes ACS patients in 134 sites across 19 countries in Latin America, the Middle East, and both North and South Africa. The registry has followed 9732 patients for a period of one year. Out of these patients, 45% were diagnosed with STEMI and 52% with NSTEMI. Among the STEMI patients, fibrinolysis was administered to 30%, while primary PCI was utilized in 26% of cases [22, 23] Thrombolysis remains a prevalent technique for restoring blood flow among myocardial infarction patients in Yemen and is mostly performed in the ICU/CCU of hospitals rather than in outpatient emergency medical services or emergency rooms. The most commonly used thrombolytic agent is usually streptokinase, as opposed to TNK or rTPA, primarily due to socioeconomic constraints and limited resources and therefore unaffordable for our patient. Thrombolysis remains a prevalent technique for restoring blood flow among myocardial infarction patients in Yemen and is mostly performed in the ICU/CCU of

hospitals rather than in outpatient emergency medical services or emergency rooms. The most commonly used thrombolytic agent is usually streptokinase, as opposed to TNK or rTPA, primarily due to socioeconomic constraints and limited resources and therefore unaffordable for our patient. The European Society of Cardiology recommends fondaparinux as adjunctive treatment after streptokinase. In our study, fondaparinux has never been prescribed; the reason may be unavailability or high cost. But the only The following medications were prescribed at discharge: aspirin at 87.6%, statins at 86.43%, beta-blockers at 67.8%, ACE inhibitors at 73.7%, and ARBs at 7.0%. The most used P2Y12 is Clopidogrel; however, about 20% of patients with STEMI discharged with no Clopidogrel, which may be due to hemorrhagic complications. Ticagrelor and prasugrel had never been used; this may be due to their unavailability and high cost.

6. LIMITATIONS OF THIS STUDY

These data might not represent the actual practice, where all these data had been collected from one tertiary hospital in the capital, Sana'a City.

7. CONCLUSIONS

Primary percutaneous coronary intervention is the preferred reperfusion therapy to restore coronary blood flow, save myocardium, and improve outcome. The highlights of our study are the late presentation of our patient due to lack of awareness and medical insurance and lack of hospitals that facilitate percutaneous coronary intervention in many areas of the country. Our patients were younger than in other countries. Only 14% of our patients were treated by percutaneous coronary intervention due to very late presentation, and 28% of our patients received thrombolytic therapy, mainly in the form of streptokinase.

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