



A STUDY ON MECHANICAL COMPLICATIONS AND ITS OUTCOMES IN PATIENTS WITH ACUTE ST-ELEVATION MYOCARDIAL INFARCTION

General Medicine

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ABSTRACT

Background: Coronary artery disease is a prime contributor to mortality and morbidity globally. The main mechanical complications following acute myocardial infarction include ruptures of septum, free wall as well as the papillary muscles of the ventricles. Echocardiography is done for diagnosis and differentiation of these conditions. **Objectives:** To detect the proportion of patients developing mechanical complications following acute STEMI and to assess the in-hospital mortality of these patients. **Methods:** A cross-sectional descriptive study conducted on 120 patients of acute STEMI in the Department of General Medicine, Al-Ameen Medical College, Vijayapur over a period of 18 months. Data collected through a proforma and analysed using Microsoft excel and IBM SPSS Software. **Results:** Of the 120 patients with STEMI, 7 patients developed mechanical complications in the form of VSR seen in 2 (1.6%), severe MR in 4 (3.3%) and FWR in 1 (0.8%) of patients. Out of 8 deaths, 1 was due to VSR (50%), 1 due to severe MR (25%) and 1 due to FWR (100%) per se and the rest 5 deaths were due to other causes. **Conclusion:** A total of 5.8% developed mechanical complications and the mortality rate among them were significantly high.

KEYWORDS

Myocardial Infarction, Mechanical Complications, Echocardiography, Mortality

INTRODUCTION

Coronary artery disease (CAD) stands as one of the most prevalent causes of death and morbidity globally. For those diagnosed with CAD, the leading causes of death are acute coronary syndromes (ACS), which include unstable angina (UA), non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI). We have witnessed a dramatic decrease in the death rate over the past 20 years associated with ACS in the developed world due to the advent of a vast array of invasive and non-invasive therapeutic techniques [1,2]. However, among Indians, the death rate is still high [3,4].

Compared to other populations worldwide, Indians experience CAD 5–10 years earlier, and this unusual occurrence mostly affects the nation's 35–65 year old productive workforce. Indians likewise have extremely high rates of ACS and CAD [3,6,7]. Around the world, India has the greatest ACS burden [6].

Ruptures in the left ventricular free wall, papillary muscle, and ventricular septum are the three main mechanical consequences following acute myocardial infarction (AMI). An AMI-related ischemic necrosis results in a defect in the interventricular septum, usually occurring after a transmural infarct. The Ventricular septal rupture (VSR) are either simple or complex and can be distinguished by an Echocardiography. Acute mitral regurgitation (MR) is a severe complication of AMI that, when identified early, can be treated with urgent surgical intervention. It usually follows papillary muscle rupture and median time to develop is about 13 hours. Left ventricular free wall rupture (FWR) occurs in 0.5% of patients with AMI and is associated with a mortality rate of 20% [8].

Primary percutaneous coronary intervention has dramatically decreased serious mechanical problems since it was first used as an AMI treatment option. It is recommended to use echocardiography in conjunction with color-flow Doppler to diagnose and differentiate between these diseases. Preoperative optimization, such as using an intra-aortic balloon pump and vasodilators, can help lower afterload on the affected ventricle and improve short-term cardiac output [8]. It shouldn't, however, postpone necessary surgical intervention. Extensive randomized clinical trials have revealed early mortality rates of 6% to 9% (30-35 days) despite treatment advances, even for patients receiving thrombolytic therapy within 6 hours after symptom start, as post-MI complications still pose a risk to recovery for certain patients.

Patients with mechanical problems from AMI still mostly need surgical surgery despite high rates of mortality since medical treatment has a poor track record of improving patient outcomes. There is a dearth of information available today regarding mechanical complications and treatment trends in the developing world after the

initial STEMI.

Prompt diagnosis following a strong suspicion and quick intervention is principal for the survival of patients with high risk. It might be difficult to diagnose these disorders in an emergency, particularly in cases where the patient is exhibiting dyspnea and shock. Timely echocardiographic evaluation is essential followed by urgent surgical treatment when feasible.

Aims And Objectives

1. To detect the proportion of patients developing mechanical complications following acute STEMI.
2. To assess the in-hospital mortality rate of patients who develop mechanical complications.

MATERIALS AND METHODS

Cross-sectional descriptive study done over an 18-month period. Patients who are diagnosed with acute STEMI in the medicine department of AL-AMEEN MEDICAL COLLEGE AND HOSPITAL, VIJAYAPUR (a tertiary care centre) that satisfied the inclusion and exclusion criteria were taken. The study got the approval by the ethical committee.

Inclusion Criteria: Patients diagnosed as Acute STEMI.

Exclusion Criteria: Pre-existing structural heart disease.

Method Of Collection Of Data: Informed consent taken from the patient. A detailed history and examination of the patient is followed by an ECG and an echocardiography. Any relevant events like the development of mechanical complications like VSR, MR or FWR and the mortality was noted during the hospital stay.

Research Question: What is the proportion of patients developing mechanical complications among STEMI and what is the mortality of these patients?

Data Management And Statistical Analysis: Data will be inputted into a Microsoft Excel Spreadsheet and analyzed using IBM SPSS software.

RESULTS

The target sample size of 120 patients for my study was obtained over 18 months (September 2022-March 2024) from the Department of General Medicine, Al-Ameen Medical College, Vijayapur.

Baseline Characteristics: Of 120 patients with STEMI, 67 (55.8%) were males and 53 (44.2%) were females.

Age And Incidence: The highest incidence of STEMI was seen in age between 46-60 years, 64 patients of which 42 were males and 22 were

females. The lowest was in 25-45 years, 10 patients of whom 7 were males and 3 were females. 46 patients, 18 males and 28 females were seen in age group > 60 years.

Site: Out of 120 patients with STEMI, 69 had anterior wall MI, 41 had acute inferior wall MI isolated or with different combinations like RV MI, posterior wall or lateral wall involvement and the remaining 10 had other sites like isolated lateral or posterior wall MI.

Treatment: Of the 120 patients, 72 (60%) cases were thrombolysed; 64 with streptokinase, 4 with tenecteplase, 3 with alteplase and 1 with reteplase and 48 (40%) just anticoagulated with heparin either unfractionated (UFH) or low molecular weight (LMWH) due to many factors including late presentation.

In Hospital Complications: The mean duration of hospital stay was 5 ± 2 days. Out of 120 patients, 7 (5.8%) developed re-infarction, 6 (5%) developed MODS. Mechanical complications in the form of VSR were seen in 2 (1.6%), severe MR in 4 (3.3%) and FWR in 1 (0.8%) of patients.

Table 1: In Hospital Complications

Complications	No. of patients	%
RE-INFARCTION	7	5.8
MODS	6	5
VSR	2	1.6
SEVERE MR	4	3.3
FWR	1	0.8

Mortality Data: 8 out of 120 patients admitted died during the hospital course resulting in a mortality rate of 6.6%.

Age And Mortality: Mortality was maximum in the > 60 age group.

Table 2: Age And Mortality

Age group	Total patients	Mortality (%)
25-45	0	0
46-60	3	37.5
> 60	5	62.5

Sex And Mortality: Out of 8 deaths, 4 were females and 4 were males. 3 females belonged to age group > 60 years and 1 belonged to age group of 46-60. In males, 2 belonged to age group > 60 years and 2 in age group 46-60.

Mechanical Complications And Mortality: 7 patients developed mechanical complications out of which 2 patients developed VSR, 4 patients developed severe ischemic MR and 1 patient developed free wall rupture.

Table 3: Mechanical Complications And Mortality

Complication	Total	No. of death
VSR	2	1
SEVERE MR	4	1
FWR	1	1

DISCUSSION

A total of 120 patients satisfying inclusion criteria with acute STEMI were admitted in the Medicine department at Al-Ameen Medical College, Vijayapur, of which, 67 were males and 53 were females.

The highest incidence of STEMI was seen in age between 46-60 years, 64 patients, 62.6% (42) of males and 41.5% (22) of females. The lowest was in 25-45 years, 10 patients, with 10.4% (7) of STEMI in males and 5.6% (3) cases in females were seen in this age group. 46 patients, 26.8% (18) males and 52.8% (28) females were seen in the age group > 60 years were seen. There was a male preponderance in those presenting < 60yrs but in those > 60yrs age, the opposite was observed.

At presentation, the mean age in our study is 56.5 ± 10.2 years. This is comparable with studies like Gulf RACE registry (56.4 ± 13 years) [9], SPACE registry (58 years) [10], and with Indian studies such as Sindhu NS et al. (56.06 ± 11.29 years) [11], CREATE registry (56 ± 13 years) [6], Jose and Gupta study (57 ± 13 years) [5], Sharma et al. (54.70 ± 19.90 years) [12], but less compared to Kerala ACS registry (60.4 ± 12.1 years) [13]. The mean age in this study is quite lower than in studies from the west such as European Heart Surveys (European Heart Surveys) I [14] and II [15] (65.2 and 64.7 years, respectively),

Hochman et al (69 years) [16], and Chang et al. (73 years) [17].

41 (34.2%) had an inferior wall in isolation or in combination like RV, posterior wall or lateral wall. 69 (57.5%) had anterior wall and remaining 10 (8.3%) had isolated lateral or posterior. Similar to studies by Jose and Gupta [5] and Sindhu NS et al [11], AWTMI was more prevalent than IWMI. These results are different from the study by Singh et al [18].

60% (72) cases were thrombolysed, out of which 64 cases with streptokinase, 4 cases with tenecteplase, 3 cases with alteplase and 1 cases with reteplase. 40 % (48) were anticoagulated with heparin, either unfractionated or low molecular weight, due to multiple causes including delayed presentation.

In a total of mean duration of stay at the hospital of 5 ± 2 days, 5.8% had a reinfarction and 5% developed MODS. 5.8% developed mechanical complications out of which 1.6 % had VSR, 3.3% developed severe ischemic MR and 0.8 % developed free wall rupture.

The mortality rate during hospital stay amounted to 6.6 % with maximum mortality in the > 60 years age group (62.5%) followed by 46-60 years age group (37.5%).

Out of 8 deaths, 4 were females and 4 were males. 3 females belonged to age group > 60 years and 1 belonged to age group of 46-60. In males, 2 belonged to age group > 60 years and 2 in age group 46-60.

Of the 120 patients with STEMI, 7 developed mechanical complications in the form of VSR seen in 2 (1.6%), severe MR in 4 (3.3%) and FWR in 1 (0.8%) of patients. 1 patient with VSR, 1 patient with severe MR and 1 patient with FWR died due to the complication per se and the rest 5 deaths were due to other causes.

Female patients, individuals not thrombolysed, those with IWMI and age over 60 years exhibited higher mortality rates.

CONCLUSIONS

1. A total of 5.8% developed mechanical complications in the form of VSR (1.6%), Acute severe MR (3.3%) and FWR (0.8%) and the mortality rate among them were significantly high.
2. Timely hospitalization is critical for myocardial salvage through thrombolytic therapy. Therefore, ongoing education for primary healthcare workers, public awareness of AMI symptoms, especially in rural areas, and improved accessibility to transportation facilities can facilitate early admission and enhance the management of AMI.

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