

## FREQUENCY OF MECHANICAL COMPLICATIONS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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### Contribution

All the authors contributed significantly to the research that resulted in the submitted manuscript.

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### ABSTRACT

**Objective:** : To document the frequency of mechanical complications in patients with acute myocardial infarction.

**Methodology:** : The study was conducted from February 2009 to October 2011 in Cardiology department LRH. In this study, 5120 patients with acute ST elevation myocardial infarction (STEMI) were evaluated for mechanical complications. Acquired ventricular septal rupture (VSR), moderate to severe mitral regurgitation (MR), free left ventricular wall rupture, were considered as post-AMI mechanical complications. Diagnosis of VSR and MR were made on 2D and Color Doppler Echocardiography. Frequency, percentages and Mean  $\pm$  SD were used for categorical and numerical variables, respectively.

**Results:** A total of 5120 patients were enrolled in the study, males were 54.4%, mean age was  $61 \pm 9.7$  years (45 to 85 years). Smokers were 21%, positive family history for coronary artery diseases was in 32%, hyperlipidemia in 18.5%, hypertensives were 14%, diabetics were 35% and 31.1% had history of coronary artery disease. Among these 68 (1.32%) patients had either acquired VSR and/or MR. VSR 44 (65.6%), MR 21 (30.1%), while both VSR and MR were seen in 3 (4.0%) patients. The number of patients who were timely thrombolysed with streptokinase was 30 (44.1%), half of these had either VSR or MR. More patients with mechanical complications had acute anterior MI, (52.9). The in-hospital mortality was 17.4%.

**Conclusion:** Mechanical complications after acute myocardial infarction are a less common finding. Majority of the patients were in advanced age group. More patients with anterior MI had both VSR and MR. All those patients who died in hospital had acquired VSR.

**Keywords:** Acute ST elevation Myocardial Infarction, Mechanical Complications.

## INTRODUCTION:

Mechanical complications after acute myocardial infarction (AMI) are rare but have very high mortality rates. 1-3 In the pre-thrombolytic era their occurrence was 1-2% with a mortality reaching 70-80%.<sup>3-6</sup> The incidence has dramatically reduced after thrombolytics has been introduced (GUSTO 1).<sup>7</sup> With early reperfusion and closed monitoring the overall mortality with AMI has markedly reduced not only in uncomplicated cases but also in patients with dreadful complications.<sup>5</sup> The mechanical complications like; ventricular septal rupture (VSR), acute mitral regurgitation (MR) and myocardial free wall rupture can occur with any AMI but are more frequent with acute anterior wall MI.<sup>4,5,8</sup> An early assessment for mechanical complications is crucial to make the urgent diagnosis by echocardiography and subsequently plan the most appropriate medico-surgical management.<sup>9-11</sup> Risk factors related to these complications include higher age, female sex, hypertension, diabetes mellitus, dyslipidemia, past history of coronary artery diseases, first AMI and absence of collaterals.<sup>12</sup> The more these risk factors are in any patient, the more are the chances of development of mechanical complications.<sup>13,14</sup> The aim of this study was find the frequency of mechanical complications and their in-hospital outcome among patients with acute ST segment elevation myocardial infarction.

## METHODOLOGY

In this study, 5120 patients with acute ST elevation myocardial infarction (AMI) were evaluated for mechanical complication from February 2009 to October 2011. All patients were admitted in Cardiology department Lady Reading Hospital Peshawar. Study protocol was approved by the hospital ethical review committee. A Performa was designed to record patient demographics and objective oriented data. Patients of both genders and all ages who had any of the mechanical complication, either acquired ventricular septal rupture (VSR), mitral regurgitation (MR) or any other, regardless of their revascularization status were included in the study. The mechanical complications were diagnosed on ACUSON CV 70 echocardiographic machine in the echocardiographic laboratory of the cardiology department. VSR was labeled when there was color flow across the interventricular septum. Moderate to severe MR was diagnosed when there was regurgitant flow across the mitral valve during systole and the regurgitant jet occupies more than 25% of the left atrial volume.

The collected data was recorded on Statistical Package for Social Sciences version 16.0 software (SPSS Inc., Chicago Illinois). Continuous variables like age were presented as Mean  $\pm$  SD. Categorical variables like gender, type of myocardial infarction, type of mechanical complications,

status of thrombolytic therapy, diabetes, hypertension, cigarette smoking, and mortality were presented as percentages.

## RESULTS

A total of 5120 patients were enrolled in the study, males were 54.4%, mean age was  $61 \pm 9.7$  years (45 to 85 years), smokers were 21%, positive family history for coronary artery diseases was present in 32%, hyperlipidemia was 18.5%, hypertensive were 14%, diabetic were 35% and 31.1% had history of coronary artery disease as shown Figure 01.

VSR was recorded in 44 (65.6%), MR 21(30.1%), while both VSR & MR were seen in 3(4.0%) patients. The number of patients who were timely thrombolysed with streptokinase was 30 (44.1%), half of these had either VSR or MR.

More patients with mechanical complications had acute anterior MI (Table 01). VSR was common 29 (42.6%) in anterior MI while MR 7(10.3%) was more common in acute inferior MI (Table 02). The in-hospital mortality rate was 17.4% (n-12).

## DISCUSSION

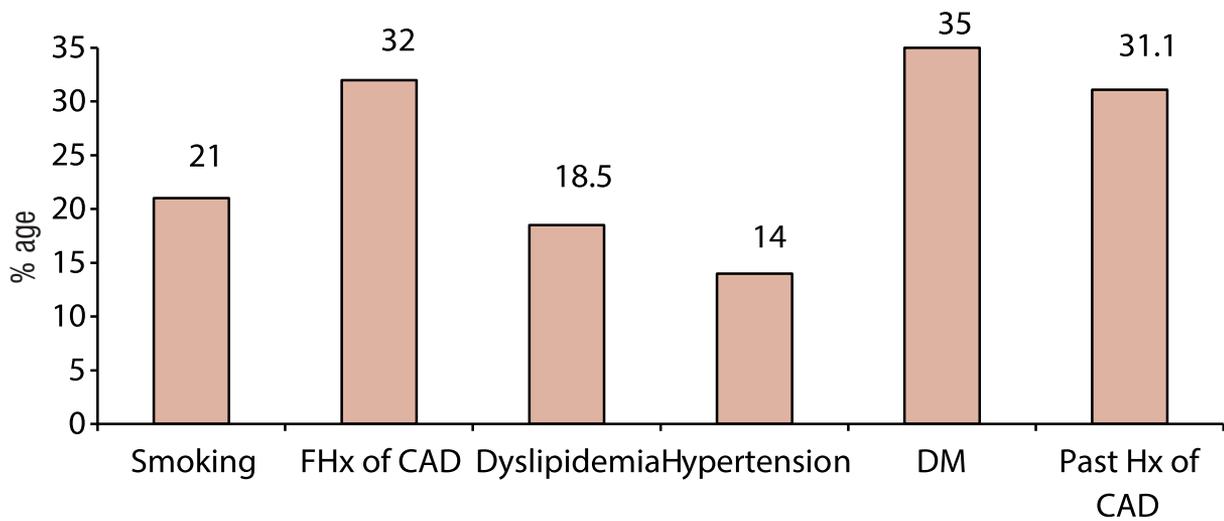
Life threatening mechanical complications after acute myocardial infarction (AMI) are infrequently encountered now-a-days due to timely interventional strategies including thrombolytics and/or primary percutaneous coronary interventions (PCI). Ventricular septum rupture (VSR) and acute mitral regurgitation (AMR) are likely to develop between day 2-5 but can occur as early as 24hours after AMI. Free wall rupture (FWR) by in large develops around day 5 in 50% of cases and by 2 weeks after AMI, 90% will have developed this complication.<sup>10</sup>

Acute MR is more like to develop in patients with inferior posterior AMI or anterior AMI with left ventricular (LV) dilatation. Mechanism of acute MR is ischemia related papillary muscle dysfunction, mitral annular dilatation due to LV enlargement and rarely partial or complete rupture of papillary muscle.<sup>8,11,12,14</sup> We documented MR in 30.1% (n-21) of our patients and majority of them were having acute inferior MI, 10.3% (n-7), almost similar incidence of MR in inferior MI (11.7%) was reported by Calvo EF11 and 9.4% by Acar J<sup>13</sup>.

Patients with mild or mild to moderate MR are clinically silent and patients with moderate to severe MR have mid systolic softer murmur rather than holosystolic murmur of chronic MR. Patients with moderate to severe MR are more symptomatic than those with VSR having more dyspnea and pulmonary edema and shock. (References Of This)

VSR and FWR are more likely to develop in patients with advanced age, female sex, hypertension, first myocardial

**Figure 1: Frequency of Different Risk Factors**



**Table 1: Frequency of different Acute Myocardial Infarction (MI) With mechanical complication**

S.No	Type of Acute Myocardial (MI)	Frequency % (n)
1.	Acute Anterior MI	52.9 (36)
2.	Acute Inferior MI	29.4 (20)
3.	Acute Anterio-Lateral MI	5.8 (4)
4.	Acute Anterio - Inferior MI	5.8 (4)
5.	Acute Inferior- Posterior MI	2.9 (2)
6.	Acute Inferior MI with RV Infarct	2.9 (4)
Total		100 (68)

RV: Right Ventricle

**Table 2: Frequency of mechanical complications in different Myocardial infarctions**

S.No	Type of Acute Myocardial (MI)	VSR % (n)	MR % (n)	VSR+MR % (n)	Total % (n)
1.	Acute Anterior MI	42.6 (29)	7.3 (5)	2.5 (2)	52.9 (36)
2.	Acute Inferior MI	17.6 (12)	10.3 (7)	1.5 (1)	29.4 (20)
3.	Acute Anterio-Lateral MI	4.4 (3)	1.5 (1)	0	5.8 (4)
4.	Acute Anterio - Inferior MI	0	5.8 (4)	0	5.8 (4)
5.	Acute Inferior- Posterior MI	0	2.5 (2)	0	2.9 (2)
6.	Acute Inferior MI with RV Infarct	0	2.5 (2)	0	2.9 (2)
Total		65.6 (44)	30.1 (21)	4.0 (3)	100 (68)

infarction and having no coronary arteries collaterals. Acquired VSR is the most common mechanical complication after AMI and it occurred in 65.6% (n=44) of our patients. Majority of whom had Anterior MI, 42.6 % (n=29), while 37.2% cases of VSR were reported by Kjeld T et al<sup>5</sup>, more than 80% (84.3%) of his study population were revascularized thus reducing the frequency of mechanical complications in his study population. On the other hand we could only thrombolysed 37.5% of our patients who had VSR, the rest were not hemodynamically fit for thrombolytic or invasive revascularization.

The outcome of such patients who had any of the mechanical complication and were not revascularized is dismal. We reported 17.4% (n=12) mortality and all were having VSR. Birnbaum Y10 observed 15.2% mortality in patients with VSR and who were not thrombolysed.

**CONCLUSION**

Mechanical complications after acute myocardial infarction is a less common finding. Majority of the patients were in advanced age group. More patients with anterior MI had both VSR and MR. All those patients who died in hospital were having acquired VSR.

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