

## FREQUENCY OF MITRAL REGURGITATION IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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### ABSTRACT:

#### INTRODUCTION:

*Mechanical complications can occur after acute myocardial infarction. Most commonly mitral regurgitation (MR) occurs after infero-basal myocardial infarction (MI) due to papillary muscles dysfunction. MR may also develop with antero-apical MI. The objective of the study was to determine the frequency of mitral regurgitation in acute MI patients and to risk stratify the patients with MR for anterior and inferior wall MI.*

#### AIMS & OBJECTIVE:

*To assess the frequency of mitral regurgitation in patients with acute myocardial infarction.*

#### MATERIAL & METHODS:

*This was a descriptive case series carried out at the Cardiology department of Jinnah Hospital, Lahore from: 29-10-2013 to 29-04-2014. A total of 340 patients of MI were included. Echocardiography examination was carried out on all subjects on day 3-4 post MI. Frequency of mitral regurgitation in each group was measured by color flow Doppler technique.*

#### RESULTS:

*Out of study population, 153 (45%) were in between 30-50 years and 187 (55%) were in between 51-75 years. The mean of age was calculated as 55.09+11.81 years. In our data 181 (53.24%) were male and 159 (46.76%) were female. Frequency of MR in acute MI patients was recorded in 69 (20.29%) while 271 (79.71%) had no findings of MR. From the total of 69 cases, MR was recorded in 13 (18.84%) as anterior wall MI and 16 (23.19%) as inferior wall MI, p value was calculated as 0.532 which shows insignificant difference. There was a significant difference in hospital stay and mortality between both groups p-value 0.04.*

#### CONCLUSION:

*Mitral regurgitation is not uncommon after acute myocardial infarction. Location of MI does not predict MR but once developed has serious outcome.*

#### KEY WORDS:

*Acute MI, mitral regurgitation, anterior and inferior wall MI.*

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## INTRODUCTION

Mitral regurgitation after acute myocardial infarction occurs due to involvement of papillary muscles.<sup>1</sup> It may be acute or chronic<sup>2,3</sup>. The frequency of mitral regurgitation due to ischemia varies from 1.6-19.4% in the angiographic studies to 8-74% in the echocardiographic<sup>3</sup>. The recommended diagnostic modality is Transthoracic echocardiography.<sup>4,5</sup> Mitral regurgitation may be associated with a high risk of heart failure and cardiac mortality<sup>6</sup>. Mitral regurgitation that occurs after myocardial infarction is a powerful predictor of morbidity and mortality<sup>7</sup>. Mitral regurgitation worsens the outcome in patients of ST-segment elevation myocardial infarction (STEMI) who undergo a percutaneous revascularization.<sup>8</sup> However, best short term as well as long term results can be obtained if valve repair is done before the symptoms appear, so early detection and assessment of mitral regurgitation is very important<sup>9</sup>.

It has been shown that there is no significant difference in mitral regurgitation quantitative parameters between the anterior and inferior wall myocardial infarction<sup>10-11</sup>. Yosefy et al<sup>2</sup> in a study has reported that MR occurred in 9% of patients with only anterior MI versus 17% with inferior wall MI. Frequency of MR is 17-55% in literature<sup>12</sup>. There is higher frequency of MR after inferior wall MI due to remodeling which pushes papillary muscles away from its normal position. In a study done by Kumanohoso et al<sup>13</sup> showed that the percentage of mitral regurgitation jet area and the prevalence of significant regurgitation (percentage of jet area of 10% or greater) was greater in inferior wall infarction than anterior wall infarction ( $P = .0002$ ), overall MR was noted in 21.35% patients of which inferior wall MR was present in 16(15.53%) and in anterior wall MR was noted in 6(5.82%)<sup>11</sup>.

The rationale of this study is that MR may be a predictor of worse outcomes after MI because it is associated with death / heart failure and indicates high risk patients. Previous studies have shown variable frequency of MR in acute anterior and inferior myocardial infarction.

## MATERIAL & METHODS:

This descriptive case series was carried out in cardiology department of Jinnah Hospital, Lahore over the period of 6 months from 29-10-2013 to 29-04-2014. A total of 340 patients of myocardial infarction (MI) fulfilling the inclusion criteria were included in the study. Patients of both genders with age range of 30 to 75 years with no previous

history of coronary artery disease. All patients of acute STEMI assessed by ECG (ST elevation  $>2$  mm in precordial leads and  $>1$  mm in limb leads) were included in the study. Echocardiography examination was carried out on all subjects on day 3-4 post MI. Frequency of mitral regurgitation in each group was measured by color flow Doppler technique. Patients with previous valvular heart disease based on prior evidence from history and echocardiography. Non ST segment elevation MI (NSTEMI) determined on ECG. Post mitral Valve replacement or Post CABG patients determined on history and examination were excluded from the study.

## OPERATIONAL DEFINITIONS:

Mitral Regurgitation:

- Presence of backward / retrograde flow across a closed mitral valve as assessed qualitatively by transthoracic echocardiography (color flow Doppler technique). It was assessed on 3-4 day post MI.

Acute anterior wall myocardial infarction:

- ST segment elevation of  $> 2$ mm in any two adjacent chest leads (V1 to V6) with positive Troponins by kit method.

Acute inferior wall myocardial infarction:

- ST segment elevation of  $> 1$ mm in any two inferior limb leads (II, III, avF).

## STATISTICAL ANALYSIS:

Data was analyzed using SPSS version 17.0. Numerical variables like age and duration of MI were analyzed by mean and standard deviation. Categorical variables including gender, presence or absence of mitral regurgitation were expressed in frequencies and percentages. Data stratification was done for anterior and inferior wall MI in patients with MR and post stratification Chi-square test was used to compare the groups for significant difference. A  $P$ -value  $\leq 0.05$  was taken as significant.

## RESULTS:

Out of study population, 153 (45%) were in between 30-50 years and 187 (55%) were in between 51-75 years. The mean of age was calculated as  $55.09 \pm 11.81$  years. In our data 181 (53.24%) were male and 159 (46.76%) were female. Frequency of MR in acute MI patients was recorded in 69 (20.29%) while 271 (79.71%) had no findings of MR. (Table No. 1)

Table 2 showed that in our study there were 34 (49%) smokers in MR group and 149 (55%) smokers in No MR group. Similarly there were 40 (58%) diabetic, 31 (45%) patients with family history of CAD and 44 (64%) hypertensive patients

found in MR group and 163 (60%) diabetic, 173 (64%) patients with family history of CAD and 187 (69%) hypertensive patients found in No MR group. (Table No. 2)

Out of 69 cases, MR was recorded in 13 (18.84%) as anterior wall MI and 16 (23.19%) as inferior wall

MI, p value was calculated as 0.532 which shows insignificant difference. There was a significant difference in hospital stay and mortality between both groups p-value 0.04. (Table No. 3)

**DISCUSSION:**

MR is commonly associated with infero-basal

TABLE - 1: DISTRIBUTION OF AGE AND GENDER (n=340)		
		No. of patients
Age(in years)	30-50	153 (45%)
	51-75	187 (55%)
Mean±SD	55.09 ± 11.81	
Gender	Male	181 (53.24%)
	Female	159 (46.76%)
MR	Yes	69 (20.29%)
	No	271 (79.71%)

TABLE - 2: Risk Factors and Early Outcomes		
	MR (69)	No MR (271)
Smoking Status	34 (49%)	149 (55%)
Diabetes	40 (58%)	163 (60%)
Family History of CAD	31 (45%)	173 (64%)
Hypertension	44 (64%)	187 (69%)

TABLE - 3: ASSOCIATION OF ANTERIOR AND INFERIOR WALL MI WITH MR (n=69)			
Location	Yes	No	P value
Anterior	13	56	0.532
Inferior	16	53	
Early Outcomes	MR	No MR	P Value
Hospital stay (days)	9.12 ± 3.02	5.32 ± 2.08	0.04
Mortality	3 (4.35%)	0 (0%)	0.04

MI and is due to papillary muscle dysfunction. MR may also be associated with anterior wall MI.

This study was planned considering the fact that MR is a strong predictor of worse outcomes after MI and is linked with higher mortality and heart failure. Thereby, having prognostic impact in patients with MR. Previous studies are showing variable frequency of MR in acute anterior and inferior myocardial infarction, so the results of the our study may determine the frequency of MR in anterior and inferior wall MI in tertiary care hospital settings among patients presenting with myocardial infarction. The objective of the study was to

determine the frequency of mitral regurgitation in acute MI patients and to risk stratify the patients with MR for anterior and inferior wall MI.

Out of study population, 153 (45%) were in between 30-50 years and 187 (55%) were in between 51-75 years. The mean of age was calculated as 55.09+11.81 years. In our data 181 (53.24%) were male and 159 (46.76%) were female. In a previous study by Nishino et al, (2016) the mean age of the cases in MR group was 68.5 + 12.05 years. There were 45% females enrolled in the study conducted by Nishino et al, (2016).<sup>11</sup>

There were 34 (49%) smokers in MR group and

149 (55%) smokers in No MR group. Similarly there were 40 (58%) diabetic, 31 (45%) patients with family history of CAD and 44 (64%) hypertensive patients found in MR group and 163 (60%) diabetic, 173 (64%) patients with family history of CAD and 187 (69%) hypertensive patients found in No MR group.

Frequency of MR in acute MI patients was recorded in 69 (20.29%) while 271 (79.71%) had no findings of MR. Gorman et al, showed that Ischemic MR after acute MI was developed in 55% of the cases which can easily be detected on echocardiography. In the study by Nishino et al, (2016) MR was found in 193 (19%) of cases. Study supported our findings.<sup>11-12</sup> Yosefy et al<sup>2</sup> in a study has reported that MR occurred in 9% of patients with only anterior MI versus 17% with inferior wall MI.<sup>2</sup>

From the total of 69 cases, MR was recorded in 13 (18.84%) as anterior wall MI and 16 (23.19%) as inferior wall MI, p value was calculated as 0.532 which shows insignificant difference. There was a significant difference in hospital stay and mortality between both groups p-value 0.04. Our findings are consistent with those of Kumano et al<sup>2</sup>, who found that the percentage of mitral regurgitation jet area and the incidence of significant regurgitation (percentage of jet area of 10% or greater) were higher in inferior wall infarction than anterior wall infarction (percentage of jet area: P = .0002; incidence: 38% vs 10%, P-value < 0.0001).<sup>13</sup>

Ischemic MR and transmural infero-lateral MI are strongly related with each other as shown by

previous studies. Right after an acute MI, 17–55% of patients develop MR, which is easy to spot with echocardiography. Ischemic MR was seen in 16% of people who had a cardiac catheterization in the first 6 hours after a MI, and it was severe in 3.4%. Most murmurs after an acute MI are gone by the time the patient is ready to go home. It seems that MR is very common after an acute MI, but in many patients, it is only mild.<sup>12-13</sup> Anterior and anterior-lateral MI are less likely to have severe MR.<sup>14-18</sup> In the sub-acute phase, MR occurs after small infarctions in the posterior wall that affect the posterior papillary muscle. This is because the LV remodels and the annulus gets bigger.<sup>19</sup> Studies have shown over and over that MR is more common and more severe in inferior MI than in anterior MI.<sup>15-18</sup> The results of the current study enhanced the understanding regarding pattern of MR in both types of acute MI in our population.

In our study there was a significant difference in hospital stay and mortality between both groups p-value 0.04. Cardiovascular mortality was independently associated with the presence of MR (relative risk, 2.00; 95% confidence interval, 1.28-3.04).<sup>21</sup> Another study also examined the long-term outcome of MR in 303 patients with acute STEMI as part of their study. Heart mortality was independently correlated with the presence of MR.<sup>22</sup>

#### **CONCLUSION:**

Mitral regurgitation is not uncommon after acute myocardial infarction. Location of MI does not predict MR but once developed has serious outcome. Its is associated with increase mortality and hospital stay.

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