



## A STUDY OF MITRAL REGURGITATION AND ITS ASSOCIATION WITH NON-ST ELEVATION MYOCARDIAL INFARCTION

### Cardiology

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### ABSTRACT

**INTRODUCTION:** Ischemic mitral regurgitation (MR) is a common complication of acute myocardial infarction and has a negative impact on prognosis. However, few studies have been carried out on MR after non-ST-segment elevation acute myocardial infarction (NSTEMI). Our objective was to investigate the clinical, angiographic profile and short-term prognostic implications of MR in patients with NSTEMI.

**METHODS:** The study was done in 52 patients during a period of one year who had MR with NSTEMI. Each underwent echocardiography during the hospital course, and patients were followed up clinically for a median of 1 month. The incidence for heart failure, reinfarction and death was recorded.

**RESULTS:** The patients mean age was 58.23 years and 73% patients were male. Among the study population, 22 had diabetes mellitus, 22 had hypertension, four patients had chronic kidney disease, and four had past history of coronary artery disease. 44 patients had ECG changes in the form of ST-T changes. Majority of patients with mild MR had normal ejection fraction (EF). Among patients with moderate MR, 8 had EF between 41-55%. Patient with severe MR had EF between 31- 40%. The incidence of MR were mild MR in 40 patients, moderate MR in 10 patients and severe in 2 patients. 8 patients had significant left main coronary artery disease, 38 patients had significant left anterior descending artery disease, 44 patients had left circumflex artery disease, and 34 patients had right coronary artery disease. 32 patients had triple vessel disease, 14 patients had double vessel disease, and 6 patients had single vessel disease. 26 patients were advised bypass surgery, 12 patients had multivessel percutaneous intervention. One patient died during hospital course.

**CONCLUSIONS:** In this study, presence of MR together with other unfavourable factors had a poor prognosis. This is also true for milder grades of MR. Severity of MR may affect prognosis, which requires further validation. Consequently, MR should be fully assessed and followed-up after NSTEMI in all patients.

### KEYWORDS

Mitral Regurgitation, NSTEMI- Non St Elevation Myocardial Infarction

### INTRODUCTION:

Mitral regurgitation (MR) after myocardial infarction (MI) is caused by left ventricular (LV) remodelling due to apical and posterior displacement of the papillary muscles with resulting malcoaptation of the mitral leaflets.<sup>1-4</sup> MR has been shown to be associated with poor outcomes in the acute and the chronic phase after MI.<sup>4,5,6</sup> According to American College of Cardiology (ACC)/American Heart Association (AHA) guidelines for Non ST elevation myocardial infarction (NSTEMI), initial invasive strategy could be indicated in the setting of signs/symptoms of heart failure or new/worsening mitral regurgitation<sup>7</sup>. However, the role of MR in NSTEMI is not well known. However, few studies have been carried out on MR after NSTEMI<sup>8</sup>. Our objective was to investigate the clinical, angiographic profile and short-term prognostic implications of MR in patients with NSTEMI.

### METHODS:

This cross sectional observation study was done in 52 patients of NSTEMI who had mitral regurgitation from January 2017 to December 2017. The diagnosis of NSTEMI was based on the criteria published by the European Society of Cardiology.<sup>9</sup> Patients with other causes of mitral regurgitation were excluded from the study group, with the aim of exclusively selecting those with ischemic MR. Patients with a poor ultrasound window that impeded the quantification of MR by echocardiography were also excluded. Following the recommendations of the American Society of Echocardiography<sup>10</sup> all patients underwent complete echocardiography, in which mitral valve anatomy and left atrial and ventricular diameters and volumes were measured. The ejection fraction (EF) was calculated in 2D-mode and using the Simpson biplane method. Mitral regurgitation and its grade were assessed using the proximal isovelocity surface area (PISA) and other semiquantitative methods. Patients with trivial MR were excluded. Systolic pulmonary artery pressure was calculated in reference to tricuspid regurgitation. Coronary angiography was performed using standard techniques. Significant coronary disease was defined by angiographic stenosis  $\geq 70\%$  in the epicardial coronary arteries and  $\geq 50\%$  in the left main coronary artery. Percutaneous interventions were done according to physician's discretion. Each underwent echocardiography during the first day of admission and on discharge, and patients were followed up clinically for a median of

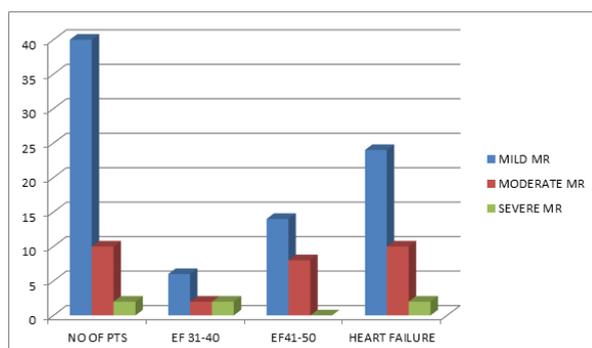
1 month. The incidence of heart failure, reinfarction and death was recorded.

### RESULTS:

The patients mean age was 58.23 years and 73% patients were male. Various clinical and angiographic parameters comparing with severity of MR are shown in table and graph. Among the study population, 22 had diabetes mellitus, 22 had hypertension, four patients had chronic kidney disease, and four had past history of coronary artery disease. 44 patients had ECG changes in the form of ST-T changes. Majority of patients with mild MR had normal ejection fraction (EF). Among patients with moderate MR, 8 had EF between 41-55%. Patient with severe MR had EF between 31- 40%. The incidence of MR were mild MR in 40 patients, moderate MR in 10 patients and severe in 2 patients. 8 patients had significant left main coronary artery disease, 38 patients had significant left anterior descending artery disease, 44 patients had left circumflex artery disease, and 34 patients had right coronary artery disease. 32 patients had triple vessel disease, 14 patients had double vessel disease, and 6 patients had single vessel disease. 26 patients were advised bypass surgery, 12 patients had multivessel percutaneous intervention. Majority of the patients had heart failure. One patient died during hospital course.

**Table: comparison of clinical and angiographic variables in patients**

|                       | MILD MR | MODERATE MR | SEVERE MR |
|-----------------------|---------|-------------|-----------|
| No. of patients       | 40      | 10          | 2         |
| Mean age (years)      | 60.6    | 64.7        | 77.1      |
| Diabetes              | 18      | 4           | -         |
| Hypertension          | 20      | 2           | -         |
| EF 31-40%             | 6       | 2           | 2         |
| EF 41-55%             | 14      | 8           | -         |
| Single vessel disease | 6       | -           | -         |
| Double vessel disease | 12      | -           | 2         |
| Triple vessel disease | 22      | 10          | -         |
| Left main disease     | 8       | -           | -         |
| Reinfarction          | 10      | 2           | -         |
| Heart failure         | 24      | 10          | 2         |
| Death                 | -       | -           | 1         |

**Graph: severity of MR and clinical variables****DISCUSSION:**

Functional MR occurs with a structurally normal valve because of an altered force balance on the mitral leaflets. The causal mechanisms of ischemic MR have been studied both in the acute and chronic stage after myocardial infarction. They include ischemia or scar at the level of the papillary muscles, annulus dilatation, change in the ventricular geometry causing tethering of the mitral leaflets, and papillary muscle rupture. Annular dilatation and systolic dysfunction have been considered additional factors that aggravate MR caused by the restricted movement of the leaflets.<sup>11-16</sup> EFs were more reduced in patients with MR after NSTEMI. Regional wall-motion abnormalities were uncommon in NSTEMI but were more frequent in patients with MR. Hibernated or stunned myocardium produces LV remodelling in hearts with no transmural necrosis and that the progressive change in LV size and shape leads to the development of MR.<sup>8</sup> Segmental dysfunction, LV dilatation, and MR are consequences of severe coronary disease and probably it is the factor most related to the development of MR after an NSTEMI. The rate of in-hospital deaths was relatively low. Aggressive management of these high-risk syndromes could be a reason for these findings. Furthermore, it is of note that the development of MR is associated with a worse long-term outcome, but it is not associated to a worse in-hospital outcome in this study. This finding could be because the deleterious action of post NSTEMI MR is based on a progressive LV remodelling and it takes time to develop. It has been described that LV dysfunction resulting from viable hibernating but recoverable myocardium has a better prognosis when revascularization is performed and that an improvement of myocardial performance and reversal of dilatation decreases MR after revascularization.<sup>17,18</sup>

This study showed NSTEMI patients had more incidence of multivessel involvement. MR patients irrespective of EF and coronary artery involvement had more incidence of heart failure and reinfarction. Age, diabetes mellitus, multivessel disease, and MR were all associated with a poor prognosis. Even the milder grades of MR were associated with more events.

**CONCLUSIONS:**

In our study, presence of mitral regurgitation together with other unfavourable factors had a poor prognosis. This is also true for milder grades of MR. Severity of mitral regurgitation affects prognosis in both short and long term, which requires further validation. Consequently, MR should be fully assessed and followed-up after NSTEMI in all patients.

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