THE EFFECT OF LEFT VENTRICULAR MASS INDEX ON THE SYSTOLIC AND DIASTOLIC FUNCTION IN ACUTE MYOCARDIAL INFARCTION PATIENTS

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Abstract

Background: Left ventricular (LV) volumes, ejection fraction (EF) and mass are important prognostic factors in patients with cardiac diseases and are therefore frequently requested for serial testing.

Objective: To assess the effect of LV mass index on systolic and diastolic function in AMI patients.

Patients & methods: This study included 75 patients, selected randomly from those presented to the CCU at Benha University Hospital with AMI. All patients were subjected to full history taking, detection of risk factors as smoking, DM, HTN, obesity and positive family history for early CAD. Twelve leads ECG was done and patients were divided into three group, Group (A): anterior myocardial infarction, Group (B): Non ST elevation infarction, and Group (C): Inferior infarction. Echocardiography was done during CCU admission & one month after discharge to assess LV mass index, LV volume, LV EF%, and diastolic function. Coronary angiography was done to assess the severity of CAD.

Results: We found that LV mass lost, increased ESV & EDV were more in Group B, and Group A, also there was more loss of mass in group that did not receive thrombolytic therapy. The study show low LVMI than the normal value in both group (A) & (B) during the 1st assessment is of prognostic value for development of heart failure after follow up (p<0.05). In the present study the increase in ESV, EDV and mass loss is
parallel to decreased systolic function in group A, B, C. The correlation
between angiographic score and LVMI was significant in anterior MI
group only. Also there was no correlation between LVMI and diastolic
function of studied groups.

**Conclusion:** The reduced LVMI has a significant effect on both systolic
and diastolic functions in patients with acute myocardial infarction and
can be used as a predictor for development of heart failure.

**INTRODUCTION**

Acute myocardial infarct (AMI) is a condition characterized by
ischemic injury and necrosis of the cardiac muscle which occurs when the
blood supply is insufficient to meet the tissue demand. (1).

The left coronary artery system covers more territory than does the
right system; therefore, an AMI in this system is most likely to produce
extensive injury, with impairment of function (2).

There are limited data on the association of LVM and geometry to
prognosis in high risk individuals following myocardial infarction (3).

**AIM OF THE WORK**

The aim of this study is to assess the effect of left ventricular mass
index on the systolic and diastolic function in patients with acute
myocardial infarction.

**PATIENTS AND METHODS**

This study included 75 patients of both gender, selected randomly
from those presented to the CCU at Benha University Hospital with acute
myocardial infarction during the period from Feb. 2007 to Dec.2008.

All patients in the study were subjected to the following:
1-Thorough history taking: With special emphasis on the onset and character of chest pain, Presence of risk factors for ischemic heart disease such as smoking, DM, hypertension, obesity and positive family history for premature coronary artery disease

2-Clinical examination: Each patient was subjected to general and local examination with baseline evaluation, follow up while the patient was admitted in the CCU, and follow up in the outpatient clinic 6 months after discharge.

Special attention was paid to the following for detection presence of heart failure or arrhythmias.

3-Laboratory assessment: Venous blood sample was taken to assess: Fasting blood glucose, Serum creatinine, Hemoglobin and CPK MB & Troponin.

4-Resting Electrocardiography: Twelve lead standard surface ECG was done to all patients under study using Schiller CS 100 apparatus and according to the ECG, the patients were divided into three groups each included 25 patients:

- **Group (A):** Extensive anterior myocardial infarction.
- **Group (B):** Non ST elevation myocardial infarction.
- **Group (C):** Inferior myocardial infarction.

5- Echo Doppler: Complete echo-Doppler study using HP & ATL apparatus for each patient was performed twice; the first study was done during hospital admission and the second 1 month after discharge to assess:

- LV mass: Left ventricular mass was measured in the parasternal short axis view by the area length method. The principle method is to estimate the total volume of the ventricle including the myocardium, and to subtract from this the volume of the cavity. This gives the volume of the myocardium, which is converted to
mass by multiplying by the specific gravity of muscle (usually taken as 1.05), then it is divided on BSA to calculate mass index (4).

The calculation of the BSA from the formula:

\[ BSA = (W^{0.425} \times H^{0.725}) \times 0.007184 \]  (5)

Normal value of the LVMI:

* Males: 76±13 gm/m^2
* Females: 66±11 gm/m^2 (4).

- LV volume and systolic function: Left ventricular volume measured in the apical 4 chamber view and in the apical 2 chamber views by modified Simpson’s method (area/length) by tracing the endocardial border of the left ventricle in systole and diastole. Then EDV subtracted from ESV and divided on EDV to calculate the EF% (6)

- Diastolic function: Left ventricular diastolic function assessed in the apical 4 chamber view using pulsed-wave Doppler technique across the mitral valve during diastole

- Mitral regurge: Presence and the degree of mitral regurge assessed in the apical 4 chamber, 2 chamber and parasternal long axis views with the color technique in the 1st and 2nd assessment echo (7)

6-Diagnostic coronary angiography: Diagnostic coronary angiography was done using Philips IH 5000 apparatus. It was performed using Judkins technique. After local infiltration anesthesia with lidocaine, the right common femoral artery was punctured using Seldinger technique. Selective coronary angiography was performed with right and left coronary catheters. Assessment of the coronary lesion was carried out by two observers who had no knowledge of the clinical criteria of the patients.
Results

The patients were divided into three groups each included 25 patients:

- **Group (A):** Extensive anterior myocardial infarction
- **Group (B):** Non ST elevation myocardial infarction
- **Group (C):** Inferior myocardial infarction

**Analysis of group (A):** *Extensive anterior myocardial infarction:* their mean age was 52.4±10.4, 22(88%) were males and only 3 patients (12%) were females, 18 patients were smokers (72%), 5 patients (20%) were diabetic, 5 patients(20%) were hypertensive, and 3 patients (12%) without risk factors.

Mean of the LVMI in the 1st assessment was 43.9±8.2gm/m² and became 43±9.9 gm/m² in the 2nd assessment with mass loss 2.02%

**Table (1): comparison between patients with mitral regurge and LVM:**

<table>
<thead>
<tr>
<th></th>
<th>Incidence in 1st assessment</th>
<th>Incidence in 2nd assessment</th>
<th>Mean of LVMI</th>
<th>EF%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.(25) %</td>
<td>No.(25) %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With MR</td>
<td>5 20%</td>
<td>8 32%</td>
<td>44.1±1gm/m²</td>
<td>36%</td>
</tr>
<tr>
<td>without MR</td>
<td>20 80%</td>
<td>17 68%</td>
<td>47.2±20gm/m²</td>
<td>40%</td>
</tr>
</tbody>
</table>

During the 1st assessment 20% of the patients had MR (mild in 12% and moderate in 8%) and in the 2nd assessment the incidence of MR increased to 32% (mild in 20%, moderate in 8% and severe in 4%).
Mean of the LVMI in patients with MR during the 1st assessment was 44 gm/m² and in the 2nd was 35 gm/m² but was 47 and 40 during the 1st and 2nd assessment respectively in patients without MR of MR).

Mean of the EF% in patients with MR in the 1st assessment was 36% and in the 2nd was 35% but was 40% and 38% during the 1st and 2nd assessment respectively in patients without MR.

In this group the incidence of clinical events during hospital admission was 12% (4% had HF and 8% had tachy-arrhythmias)

The clinical follow up after 6 months of discharge; the incidence of clinical events was 48% (16% had HF and 32% had recurrent angina that needed re-hospitalization)

*Fig.(1)*: Correlation between LVMI & EF% and diastolic function.

Figure (1) show the relation between the left ventricular mass index and EF% measured after one month of admission, and it was found that there is positive correlation between them and the result is statistically significant (p < 0.05), also show negative correlation between the left
ventricular mass index and diastolic function measured after one month of admission, and the result is statistically significant (p < 0.05).

*fig (2):* Correlation between LVMI and CPK and angiographic score

Figure (2) show that there is negative correlation between mean of the LVMI of the two measures and the score of the coronary artery lesion (with increased score, there is decline of the mass) and it was statistically significant (P<0.05), also there is negative correlation between 1st measured LVMI and CPK-MB but it was statistically insignificant (P>0.05).

There was no statistical difference in the 1st LVMI between the group who received SK and those who didn’t received SK (P>0.05).

**Analysis of group (B) Non ST elevation myocardial infarction:** Their mean age was 67.96 ±8.53, 18(72%) were males and only 7 patients (28%) were females, 13 patients were smokers (52%), 7 patients (28%) were diabetic, 7 patients(28%) were hypertensive, and 12 patients (12%) without risk factors.

The mean value of the LVMI in the 1st assessment was 51.98±8.2gm/m² (range 30-59) and was 50.39±9.9 gm/m² (range 24-58) in the 2nd assessment with mass loss 3%.
Table (2) Assessment of MR in the 1st & 2nd assessment:

<table>
<thead>
<tr>
<th></th>
<th>Incidence in 1st assessment</th>
<th>Incidence in 2nd assessment</th>
<th>Mean of LVMI</th>
<th>EF%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.(25) %</td>
<td>No.(24) %</td>
<td>1st ass.</td>
<td>2nd ass.</td>
</tr>
<tr>
<td>With MR</td>
<td>4 16%</td>
<td>8 32%</td>
<td>46 gm/m²</td>
<td>42 gm/m²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>36%</td>
<td>35%</td>
</tr>
<tr>
<td>without MR</td>
<td>21 84%</td>
<td>16 64%</td>
<td>48 gm/m²</td>
<td>44 gm/m²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40%</td>
<td>38%</td>
</tr>
</tbody>
</table>

During the 1st assessment 16% of the patients had MR (mild in 8% and moderate in 8%) and in the 2nd assessment the incidences of MR increased to 32% (mild in 16%, moderate in 8% and severe in 8%).

Mean of the LVMI in patients with MR during the 1st assessment was 46 gm/m² and in the 2nd was 42 gm/m² but was 48 gm/m² and 44 gm/m² in the 1st and 2nd assessment respectively in patients without MR.

Mean of the EF% in patients with MR in the 1st assessment was 36% and in the 2nd was 35% but was 40% and 38% in the 1st and 2nd assessment respectively in patients without MR. In this group the incidence of clinical events during hospital admission were 20% of patients, 8% of them had HF and 12% developed tachyarrhythmia, after 6 months of discharge; the incidence of clinical events were 68% (4% death, 24% had HF and 40% had recurrent angina that needed re-hospitalization).
Figure (3) show the relation between the left ventricular mass index, EF% measured after one month of admission, and it was found that there is positive correlation between them and the result was statistically significant (P<0.05), also show negative correlation between the left ventricular mass index, and diastolic function measured after one month of admission, and the result was statistically insignificant (P<0.05).

Figure (4) show that there is negative correlation between mean of the left ventricular mass of the two measures and the score of the coronary artery lesion and it was statistically significant (P<0.05), also there is negative insignificant correlation between 1st measured LVM and CPK-MB (P>0.05).
Analysis of group (c): *inferior myocardial infarction*

The mean of the LVMI in the 1st assessment was 60.89 gm/m² (range 40-80) and was 60.6 gm/m² (range 40-89) in the 2nd assessment with mass loss 0.4%.

*Table (4): Assessment of MR in the 1st & 2nd assessment:*

<table>
<thead>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>With MR</td>
<td>4</td>
<td>16%</td>
<td>5</td>
<td>20%</td>
<td>60 gm/m²</td>
<td>55 gm/m²</td>
</tr>
<tr>
<td>without MR</td>
<td>21</td>
<td>84%</td>
<td>20</td>
<td>80%</td>
<td>64 gm/m²</td>
<td>52 gm/m²</td>
</tr>
</tbody>
</table>

During the 1st assessment 16% of the patients had MR (mild in 8% and moderate in 8%) and in the 2nd assessment the incidences of MR increased to 20% (mild in 12% and moderate in 8%).

Mean of the LVMI in patients with MR during the 1st assessment was 60 gm/m² and in the 2nd was 55 gm/m², also the mean of the EF% in patients with MR in the 1st assessment was 59% and in the 2nd was 50%.

In this group the incidence of clinical events during hospital admission was 8% in the form of complete heart block, and after 6 months of discharge; clinical events was 12% (4% had HF, 8% had recurrent angina that needed re-hospitalization).
**Fig.(5):** Correlation between 2\textsuperscript{nd} measured LVMI & EF\% and diastolic function

Figure (5) show that positive correlation between the left ventricular mass index, EF\% after one month of admission, and the result is statistically significant, also show negative correlation between the left ventricular mass index, and diastolic function measured after one month of admission.

**Fig (6):** Correlation between LVMI and CPK and angiographic score

Figure (6) show that there was negative correlation between mean of the left ventricular mass of the two reading and the score of the coronary artery lesion and it was statistically significant (P<0.05), also there was negative correlation between 1\textsuperscript{st} measured left ventricular mass and CPK-MB but it was statistically insignificant (P>0.05).
Comparison between the 3 groups

Table (4): Echocardiographic and Angiographic analysis:

<table>
<thead>
<tr>
<th></th>
<th>Group (A)</th>
<th>Group (B)</th>
<th>Group (C)</th>
<th>f</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>% mass loss</td>
<td>0.5±26.6</td>
<td>3.9±10.9</td>
<td>0.02±10.9</td>
<td>0.3</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>% of EF loss</td>
<td>-7.2±23.7</td>
<td>-9.04±11.5</td>
<td>-3.6±7.2</td>
<td>0.8</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Angiographic score</td>
<td>40.8±19.2</td>
<td>31.7±25.4</td>
<td>14±14.2</td>
<td>11.4</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>% of increased EDV</td>
<td>29.3±45.2</td>
<td>37.02±48.4</td>
<td>11.1±43.6</td>
<td>0.5</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>% of increased ESV</td>
<td>41.7±45.8</td>
<td>58.9±66.1</td>
<td>16.9±43.9</td>
<td>1.1</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

Table (4) show the difference in between the 3 groups as regard to % of mass loss (from the 1st assessment to the 2nd), % of decrease of EF%, % of increase in the EDV& ESV. It was found that group (B) is the most affected followed by group (A) then group (C) but the difference is statistically insignificant (p>0.05).

Angiographic score is highest in group (B) followed by group (A) then group (C) and the difference is statistically significant (p<0.05).
Table (5): Clinical events in the 3 groups:

<table>
<thead>
<tr>
<th></th>
<th>Group (A)</th>
<th>Group (B)</th>
<th>Group (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Heart failure</td>
<td>5</td>
<td>20%</td>
<td>8</td>
</tr>
<tr>
<td>Readmission with angina</td>
<td>8</td>
<td>32%</td>
<td>10</td>
</tr>
<tr>
<td>Tachyarrhythmia</td>
<td>2</td>
<td>8%</td>
<td>3</td>
</tr>
<tr>
<td>Death</td>
<td>0</td>
<td>0%</td>
<td>1</td>
</tr>
<tr>
<td>Heart block</td>
<td>0</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>No events</td>
<td>10</td>
<td>40%</td>
<td>3</td>
</tr>
</tbody>
</table>

Table (5) show the difference in the incidence of clinical events during the hospital admission and 6months follow up in between the 3 groups: it was found that the incidence of HF, recurrent angina and death is higher in group (B) and it is statically significant (p<0.05), but the only 8% of cases of group (C) developed complete heart block it is statically significant (p<0.05).
Table (6): The prognostic value of LVMI when EF% ≥ 50%:

<table>
<thead>
<tr>
<th></th>
<th>Group (A)</th>
<th>Group (B)</th>
<th>Group (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st assessment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean of LVMI</td>
<td>47 gm/m²</td>
<td>54 gm/m²</td>
<td>65 gm/m²</td>
</tr>
<tr>
<td>% of EF ≥ 50%</td>
<td>36%</td>
<td>44%</td>
<td>72%</td>
</tr>
<tr>
<td><strong>2nd assessment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean of LVMI</td>
<td>39 gm/m²</td>
<td>48 gm/m²</td>
<td>64.2 gm/m²</td>
</tr>
<tr>
<td>% of EF ≥ 50%</td>
<td>28%</td>
<td>20%</td>
<td>68%</td>
</tr>
<tr>
<td>p</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

Table (6) it is clear that low LVMI than the normal value in patients with EF ≥ 50% in both group A & B during the 1st assessment is of prognostic value for further drop of the LVMI and EF% in the follow up assessment and it was statistically significant (p<0.05), while in group C it is within normal in both 1st and 2nd assessment and the difference is statistically insignificant (p>0.05).

Discussion

Identifying among patients recovering from acute myocardial infarction those at risk for subsequent cardiac events is important for clinical decision making (8).

David et al, 2008 confirm that the pattern of LV remodeling, obtained with simple imaging just after an MI, has important prognostic information for future events.(9)

The present study included 75 patients of both gender, selected randomly from those presented to the CCU at Benha University Hospital
with acute myocardial infarction during the period from Feb. 2007 to Dec. 2008 to assess the effect of left ventricular mass index on the systolic and diastolic function in patients with acute myocardial infarction.

**Difference between the 3 groups:**

In the present study the percent of mass loss and percent of increase of ESV & EDV is more in the NSTEMI (group B) than STEMI (group A, C) either anterior or inferior MI but the difference was statistically insignificant (P>0.05), also it was found that by the angiographic score was higher in group (B) than group (A), (C) and the difference was statistically significant (P<0.05).

The incidence of clinical events was more in the group B than in group A & C and the difference was statistically significant (P<0.05).

These results are not in agreement with results reported by **Goodman et al, 2003** who found that NSTEMI have equal short-term outcome as STEMI, (5.1 % for each type). In contrast, long-term outcomes both for mortality and nonfatal events, is actually worse for patients with NSTEMI compared with STEMI, this finding likely results from the older age, greater extent of coronary disease.(10)

Also **Orn et al, 2007** found that patients with acute anterior transmural infarcts are associated with greater left ventricular LV dilation and mass loss compared with non-trans-mural infarctions.(11)

**Mark et al, 2009** also found that STEMI was associated with a higher risk of short-term mortality with higher adjusted mortality risk during the first 2 months but NSTEMI was associated with a higher risk of long-term mortality.(12)
The prognostic value of LVMI when EF was ≥50%:

In the present study, low LVMI than the normal value in patients with EF ≥ 50% in both group (A) & (B) during the 1st assessment is of prognostic value for further drop of the LVMI and EF% in the follow up assessment and it was statistically significant (p<0.05). but in group C the mean of the mass index and mean of EF% was within normal in both 1st and 2nd assessment.

Our results are in agreement with a trial by Cesar et al, 2004 who found that LVMI has prognostic value even with normal ESV and EDV but in this trial the LV parameters were measured by gated SPECT not by Echo.(13)

LV volume & systolic function and mass index:

In the present study there is increase of the mean LV volume (LVESV, LVEDV) in the anterior, NSTEMI groups but was within normal in the inferior group, also there was loss of the LVMI in patients with anterior and NSTEMI but the mass was within normal in inferior MI.

These results are in agreement with a study by JA et al, 1998 who studied the changes in both chamber volume and myocardial muscle mass after infarction in humans and concluded that left ventricular end-diastolic and end-systolic chamber volumes increase progressively from hospital discharge to 1 year after an initial trans-mural myocardial infarction in patients with a moderately large anterior wall infarction but remain stable in patients with a small inferior wall infarction, and total left ventricular muscle mass decreases significantly during the initial 6 weeks after large anterior infarction.(14)
The results of the present study are in agreement with trial on 26 patients after their first anterior MI to examine the relation between regional changes in cardiac function and global left ventricular (LV) remodeling in the first 8 weeks after re-perfused anterior myocardial infarction (MI). All patients had single-vessel left anterior descending coronary artery disease, the study concluded that Left ventricular mass index tended to decrease, whereas the LVEDV increased, But in this trial the mass was measured by MRI not by echo.(15)

Our results are not in agreement with the results reported by Erberto et al, 2000 on 111 AMI consecutive patients (mean age 59.3±10 years) performed echocardiographic examination at pre-discharge after 1st MI. An increased LV mass and concentric geometry were important independent markers of an adverse outcome in patients with a first uncomplicated myocardial infarction and good LV function, also in another trial which studied the prognostic value of left ventricular mass in uncomplicated acute myocardial infarction.(16)

The disagreement can be explained by that the LVMI was calculated by means of Devereux’s formula (based on M-Mode measurement) and subsequently indexed by BSA not by 2D method so there was overestimation of the mass.

In the present study there was more mass loss in the group that did not receive thrombolytic therapy in group A and C but the difference was statistically insignificant.

These results are in agreement with Mark et al, 2009 who studied the efficacy of thrombolytic therapy for acute myocardial infarction
concluded that patients with 1\textsuperscript{st} anterior MI might benefit from coronary thrombolysis in a study on 54 patients who received intracoronary or intravenous thrombolysis with urokinase within 6 hours.\textit{(12)}

In a \textit{(Bellenger, 2005)} study which compared the effect of reperfusion with thrombolytic and PCI on LV remodeling, the relation was statistically insignificant with thrombolytic therapy but was significant with PCI. \textit{(17)}

In the present study the mass loss was parallel to decreased systolic function in group A, B, C with positive correlation in the 1st and 2nd assessment that was statically significant and the incidence of heart failure with reduced EF\% was 20\% in group A, 32\% in group B, and 4\% with group C.

The results of the present study are also in agreement with trial by \textit{Alfred et al, 2005} who reported that anterior myocardial infarction produces abrupt left ventricular (LV) dysynergy and global systolic dysfunction, and abnormal progressively increasing LV volume/mass ratio that leads to further LV remodeling.\textit{(18)}

\textbf{Post infarction MR:}

In the present study 52 \% of patients developed MR in the anterior group, 48 \% in MSTEMI group and 36\% in the inferior group during the 1\textsuperscript{st} and 2\textsuperscript{nd} assessment. It was associated with reduced systolic function in patients with MR where mean of EF\% was 35.5\% in the anterior group, 34.5\% in the NSTEMI group and 54\% in the inferior group, also MR associated with reduced LVMI in the anterior MI and NSTEMI groups where mean of the mass was 39.5gm/m\textsuperscript{2} in the anterior group and
44gm/m² in the NSTEMI group but it was within normal in the inferior group 57.5gm/m².

This can be explained as the mechanism of MR differ being mainly due to LV dilation and altered geometry in anterior MI and NSTEMI and due to papillary muscle dysfunction in the inferior MI group (19).

These results are in agreement with retrospective study by Uwe et al, 2007 who found that MR may be detected in patients after AMI during follow-up most probably due to geometric distortion of LV remodeling. In this study 103 post-MI patients were included according to a standardized Doppler echocardiogram <3 months following MI and follow-up examination for 6 months. They found that Patients with more vessels involved, significantly enlarged LV chamber size and significant decrease in LV performance show new development or deterioration of MR and higher degree of symptomatic congestive heart failure and greater need for heart failure medications.(19)

**The relation between coronary artery lesion and LVMI:**

The correlation between angiographic score and LVMI was negative and the correlation was statistically significant in anterior MI but was insignificant in NSTEMI and inferior MI.

Also the results of the present study are in agreement with West and Brown, 2005 who studied the relation between morphological parameters and myocardial mass measurements.(20)

Also in a study by Jenny 2008 about the scaling of myocardial mass to morphometric of coronary arteries, there was linear relation between coronary arterial lesion and myocardial mass.(21)
The relation between LVMI and cardiac enzymes:

In the present study the correlation between LVMI and CPK-MB was negative in anterior MI, NSTEMI and inferior MI groups but is statistically insignificant.

This can be explained by the fact that CPK-MB was estimated in different laboratories and not at accurate time in all patients who either received or did not receive thrombolytic therapy.

The studies that dealt with this point did not address the mass but to future events and systolic function as the study on 160 patients by Lonnaz et al, 2004 who compared those with small infarction VS large one and found that extensive infarction was associated with higher CPK-MB and lower EF% but the other group with small infarction there was lower peak of CPK-MB, little difference in LV EF%(22).

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