

Original Article

A Study of left Atrial volume index in patients of Anterior Wall Myocardial infarction as a short-term prognostic indicator

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ABSTRACT:

Background: Acute Myocardial infarction is a significant public health problem on increase in developing countries. Heart failure following AMI is a leading cause of cardiovascular mortality and morbidity and contributes to significantly to worldwide burden of CVS diseases. The incidence of HF has dramatically increased due to increasing role of coronary artery disease and hence early detection of patients with AMI at risk of development of in heart failure is necessary to limit myocardial injury and LV dysfunction. **Aim of the study:** To correlate left Atrial volume index in patients of Anterior Wall Myocardial infarction as a prognostic marker. **Materials and methods:** The current study was conducted in Dr. D. Y. Patil Hospital and Research Institute, Kolhapur, Maharashtra, India. The study design was prospective observational study. The study was conducted from September 2016 to August 2018. A total of 75 cases of diagnosed Myocardial Infarction were selected for the study. A total 75 patients with above mentioned inclusion and exclusion criteria were included in the study. All patients admitted and diagnosed as anterior wall Myocardial Infarction in D. Y. Patil Medical Hospital, Kolhapur were studied with detailed history and clinical examination. They were subjected to transthoracic 2D echocardiography examination by consultant. **Results:** There were a total 75 study subjects, out of which 70.66% were males & 29.34% were females. Mean age of study subjects was 55.81 ± 9.53 years. The mean hospital stay of study subjects having LAVI greater than 35 was 8 ± 1.89 day which was greater than that of patients with LAVI less than 35. This difference in mean hospital stay was statistically significant. There was a positive correlation between LAVI & hospital stay. This positive correlation was statistically significant. **Conclusion:** From the results of present study, we conclude that LAVI positively correlates with duration of stay in hospital and useful as short term prognostic factor in anterior wall myocardial infarction.

Key words: LAVI, myocardial infarction, echocardiography.

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INTRODUCTION:

Acute Myocardial infarction is a significant public health problem on increase in developing countries. Heart failure following AMI is a leading cause of cardiovascular mortality and morbidity and contributes to significantly to worldwide burden of CVS diseases. The incidence of HF has dramatically increased due to increasing role of coronary artery disease and hence early detection of patients with AMI at risk of development of in heart failure is necessary to limit myocardial injury and LV dysfunction. An increasing number of studies have reported the use of several indices like the ejection fraction, left atrial volume and diastolic indices like E/A ratio, deceleration time in

predicting early in-hospital failure in patients with ST elevation myocardial infarction. The increased left ventricular diastolic filling pressure evolves in left ventricular (LV) diastolic dysfunction.^{1, 2} This hemodynamic condition usually is demonstrated by the impairment of, E/A mitral inflow ratio ($E/A < 1$) or by the change of normal pattern of pulmonary veins' flow. The combination of early inflow velocity curve and tissue Doppler imaging of the mitral annulus (E/E' ratio) better estimates this condition. But, in the absence of any mitral valve derangement, LV diastolic dysfunction directly affects Left Atrial Volume (LAV). This parameter can be easily measured by two-dimensional echocardiography and

indexed to the body surface area (BSA) as left atrial volume index (LAVI). Therefore, LAVI also may be used as faithful indicator of LV diastolic dysfunction.^{3,4} Hence, the present study was planned to correlate left Atrial volume index in patients of Anterior Wall Myocardial infarction as a prognostic marker.

MATERIALS AND METHODS:

The current study was conducted in Dr. D. Y. Patil Hospital and Research Institute, Kolhapur, Maharashtra, India. The study design was prospective observational study. The study was conducted from September 2016 to August 2018. The patients diagnosed with Anterior wall myocardial infarction in Dr. D. Y. Patil Hospital and Research Institute, Kolhapur were included in the study. A total of 75 cases of diagnosed Myocardial Infarction were selected for the study.

INCLUSION CRITERIA

All patients diagnosed to have Anterior wall Myocardial Infarction at Dr. D. Y. Patil Hospital Kolhapur.

EXCLUSION CRITERIA

- Patients with previous history of heart diseases e.g: RVHD
- Patients with past history of IHD / PTCA / CABG
- Patients having persistent cardiac Arrhythmias.
- Patients having H/O chronic heart failure.

A total 75 patients with above mentioned inclusion and exclusion criteria were included in the study. The study was approved from institutional ethics committee prior to commencement of the study. All patients admitted and diagnosed as anterior wall Myocardial Infarction in D. Y. Patil Medical Hospital, Kolhapur were studied with detailed history and clinical examination. They were subjected to transthoracic 2D echocardiography examination by consultant. Transthoracic Echocardiography machine used in D.Y. Patil Hospital is Mindray Echo machine having adult cardiac probe with transducer of frequency of 3.5 MHZ. Routine standard measurements was obtained using 2-D, M-Mode and color Doppler modalities.

Left Atrial Volume is calculated by $LAV = 0.85 * A_1 * A_2 / L$ ("A₁" is maximum planimetered Left Atrial area in apical 4-chamber view."A₂" is Max. plainmetered Left Atrial Area in

apical 2-chambe view. "L" is Length measured from back wall to line across mitral valve hinge points). Left atrial volume index (LAVi) is calculated by dividing Left atrial volume by body surface area (BSA) $LAVi = LAV/BSA$.

Each patient was assessed for heart failure and classified according to Killip classification of heart failure. Cut off point of left atrial volume index was calculated for prediction of heart failure in anterior wall myocardial infarction. Roll of other comorbities like diabetes, hypertension in prediction of heart failure with help of left atrial volume index was assessed. Also, correlation between ejection fraction and LAVI was assessed.

STATISTICAL ANALYSIS

Software SPSS version 24 was used for data analysis. Results were presented in the form of tables and graphs. Reciprocal operating curve was drawn to find cut off value of LAVI in prediction of heart failure. Chi square test was used as the test of significance. Pearson correlation coefficient was calculated. P value less than 0.05 was considered for significance.

RESULTS:

Table 1 shows that there were a total 75 study subjects, out of which 70.66% were males & 29.34% were females. Mean age of study subjects was 55.81 ± 9.53 years. **[Fig 1]****Table 2** shows the comparison of hospital stay of study subjects according to LAVI. The mean hospital stay of study subjects having LAVI greater than 35 was 8 ± 1.89 day which was greater than that of patients with LAVI less than 35. This difference in mean hospital stay was statistically significant. **[Fig 2]** **Table 3** shows the correlation between LAVI & hospital stay. There was a positive correlation between LAVI & hospital stay. This positive correlation was statistically significant.

Table 1: Demographic characteristics of study subjects

Male	53
Female	22
Mean age in years	55.81 ± 9.53

Figure 1: Distribution according to gender

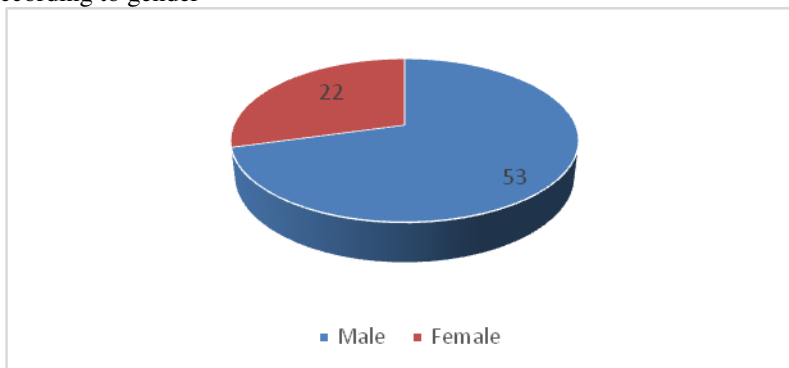


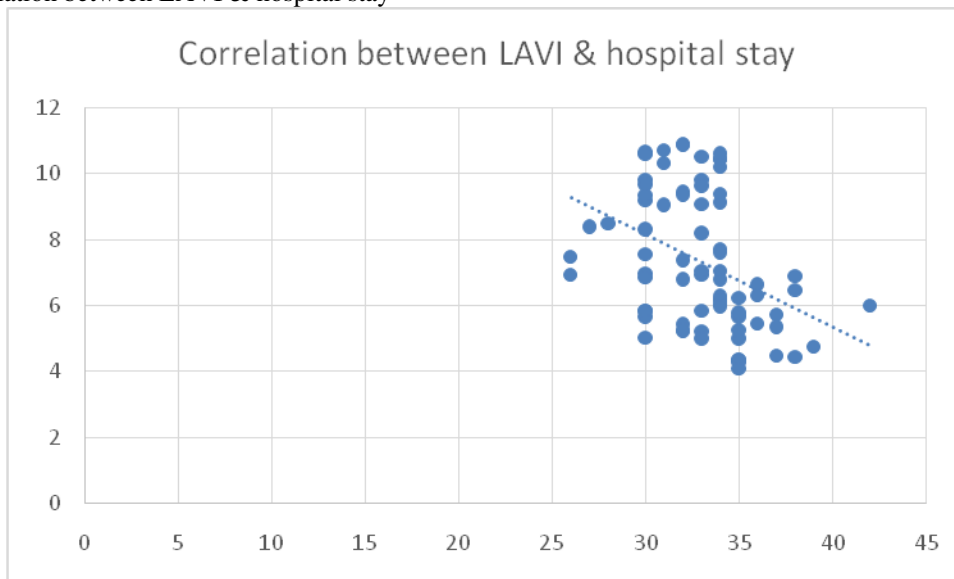
Table 2: Comparison of hospital stay of study subjects according to LAVI

Mean hospital stay in days	Left atrial index		P Value
	<35	≥ 35	
Mean	5	8	<0.01
SD	0.89	1.89	

Table 3: Correlation between LAVI & hospital stay

Pearson correlation coefficient	0.39
P Value	<0.01

Figure 2: Correlation between LAVI & hospital stay



DISCUSSION:

Present prospective observational study was carried out in a tertiary care hospital from September 2016 to September 2018 on patients diagnosed with acute anterior wall myocardial infarction. Total 75 patients were included in the study. They were subjected to transthoracic 2D echocardiography examination by consultant. Detailed history and clinical examination was carried out in all these patients. In present study there was total 75 study subjects out of which 70.66% were males & 29.34% were females. Mean age of study subjects was 55.81 ± 9.53 years. In the present study, mean hospital stay of study subjects having LAVI greater than 35 was 8 ± 1.89 days which was greater than that of patients with LAVI less than 35. This difference in mean hospital stay was statistically significant. There was positive correlation between LAVI & hospital stay. This positive correlation was statistically significant.

Maheshwari M et al studied left atrial volume index in elderly patients with left ventricle anterior infarction and correlate LAVi with left ventricle ejection fraction and transmitral Doppler flow. Control group consisted of 25 healthy elderly subjects Study group consisted of age and sex matched patients with LV anterior infarction with history of characteristic ischaemic chest pain. Patients with

valve lesions, large shunts and rythum disturbances were excluded. On transthoracic echocardiography biplane method of disks was used to calculate LA volume. LAVi was calculated by dividing LA volume by body surface area of subjects. LAVi was significantly raised in elderly patients who suffered from AMI (P<0.005). We also found significant negative correlation of LAVi with LVEF, E wave peak velocity and deacceleration time. They concluded that patients with advanced left ventricular systolic and diastolic dysfunction had a significantly larger LAVi than healthy subjects. LAVi is useful for risk stratification and for guiding therapy in such patients. Zivlas C et al examined the association of two such proteins, cystatin C (CysC) and galectin-3 (Gal-3), and other clinical, echocardiographic and biochemical parameters with LA volume index (LAVi) in patients with HF with severely impaired left ventricular ejection fraction (LVEF). A total of 40 patients with HF (31 men, age 66.6 ± 1.7) with LVEF = 25.4 ± 0.9% were divided into two groups according to the mean LAVi (51.03 ± 2.9 ml/m2) calculated by two-dimensional transthoracic echocardiography. Greater LAVi was positively associated with LV end-diastolic volume, LV end-systolic volume, mitral regurgitant volume (MRV), right ventricular systolic pressure (RVSP), restrictive diastolic filling pattern and

atrial fibrillation. Plasma CysC was positively correlated with LAVi and log-transformed plasma Gal-3 by simple linear regression analysis. Stepwise multiple linear regression analysis showed that only MRV, CysC and RVSP were significant predictors of LAVi. It was concluded that LAVi, circulating CysC and Gal-3 were associated with greater LA dilatation in patients with HF with reduced LVEF.^{5,6}

There were no much studies found on relationship between hospital stay and LAVi. Duration of stay in hospital is obviously good prognostic factor in acute anterior wall myocardial infarction. As LAVi increases duration of hospital stay also increases. This indicate that LAVi has certain role as short term prognostic factor in acute anterior wall myocardial infarction.

CONCLUSION:

From the results of present study, we conclude that LAVi positively correlates with duration of stay in hospital and useful as short- term prognostic factor in anterior wall myocardial infarction.

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