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Cardiology

EVALUATION OF LV FUNCTION BY 2 D STRAIN ECHO BEFORE AND AFTER THROMBOLYSIS.

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ABSTRACT

Objectives: To assess longitudinal strain of individual segments and global LV systolic function using novel parameter 2D speckle tracking by automated functional imaging (AFI) in patients with acute ST–elevation myocardial infarction before and after thrombolysis and to compare them with traditional parameters like wall motion score index (WMSI) and left ventricular ejection fraction(LVEF)

Methods: This was a single centre, prospective observational study conducted in the cardiology department of Madurai government Rajaji hospital from march 2017 to may 2018. Patients who presented with features of acute ST elevation myocardial infarction (STEMI) thrombolysed with inj. streptokinase were enrolled in the study. All patients were submitted to 2D TTE to assess the longitudinal strain of individual segments and global LV function by novel parameter 2D speckle tracking by automated functional imaging (AFI).

Results: In our study, 50 cases of acute ST-elevation myocardial infarction , each 25 cases from AWMI and IWMI , thrombolysed with streptokinase were taken up for our study.

Among AWMI and IWMI patients, WMSI was reduced in post thrombolytic state. Whereas GLS and LVEF, both showed improvement after thrombolysis. Also there was a positive and linear correlation between these parameters, pre and post thrombolysis.

Conclusion: Our study has shown that in acute ST elevation MI , global longitudinal strain(GLS) by STE is more sensitive than LVEF and non-inferior to WMSI as a marker of LV dysfunction.

KEYWORDS : Speckle tracking echocardiography(STE), global longitudinal strain(GLS), wall motion score index(WMSI), automated functional imaging(AFI)

INTRODUCTION

Coronary artery disease(CAD) is the leading cause of death. The acute myocardial infarction (AMI) incidence though shows declining trend in the developed countries, it is on the rise in the developing countries like India. The effective management of acute myocardial infarction (AMI) imposes an economical and social burden to the third world countries.

In addition to electrocardiography, cardiac bio-markers, echocardiography plays an important role in the management of acute myocardial infarction (AMI). Assessment of overall left ventricular (LV) systolic function as well as the regional wall motion of individual myocardial segments by echocardiography plays a vital role in assessing the prognosis as well as planning the treatment in acute myocardial infarction(AMI).

It has been well recognized that left ventricular (LV) systolic function is a major predictor of outcome after (AMI)[1.] The most commonly used and recommended measurements for echocardiographic quantification of global and regional LV systolic function are LV ejection fraction (LVEF) and wall motion score index (WMSI).[2] However, these measurements have limitations.

Biplane assessment of LVEF can be difficult because of poor endocardial border definition and is often time consuming and poorly reproducible[3.] Thereby, LVEF may appear normal in patients with remote, compensatory hyperkinesis, despite myocardial damage at the infarct zone. Wall motion score index is an alternative to LVEF, which also reflects regional systolic function. However, the assessment of WMSI is semiquantitative and experience-dependent[4]

Over the past years, various echocardiographic techniques have been developed that can assess more subtle changes in LV systolic function. Strain has been introduced as novel quantitative measurement reflecting LV function[5].The echocardiographic measurement of myocardial strain (€) offers a series of regional and global parameters that may be useful in the assessment of systolic and diastolic function[6].

Strain is the measure of tissue deformation. As the ventricle contracts, the muscle shortens in the longitudinal and circumferential dimensions (negative strain) and thickens or lengthens in the radial direction (positive strain). Myocardial strain can be measured using a variety of echocardiographic techniques[7].

Although M-mode techniques provide both accurate temporal and spatial resolution, and may therefore be used to measure strain in single direction, the current era of myocardial strain measurement began with the measurement of strain from comparison of adjacent tissue velocities by Heimdal et al[8].The major limitation of derivation of strain from tissue doppler velocity (TDI) data are signal noise, compromised spatial resolution and angle dependence.

A doppler-independent technique for strain measurement would have attractions with special respect to signal noise, angle dependency and the ability to monitor strain in two dimensions rather one dimension. Various echocardiographic techniques have been used and more recently, block matching and speckle tracking techniques. These novel parameters use two-dimensional (2D) speckle-tracking imaging and enable angle-independent quantification of myocardial deformation[9].

Myocardial strain is a principle for quantification of left ventricular (LV) function which is now feasible with speckle-tracking echocardiography (STE)[10]. The best evaluated strain parameter is global longitudinal strain (GLS) which is more sensitive than left ventricular ejection fraction (LVEF) as a measure of systolic function, and may be used to identify sub-clinical LV dysfunction.

Furthermore, GLS is recommended as routine measurement in patients to detect reduction in LV function prior to fall in LVEF[11]

In our institution, thrombolysis with inj.streptokinase is the prime mode of revascularisation for acute ST elevation myocardial infarction patients admitted in intensive cardiac care unit (ICCU) and rescue PCI for failed thrombolysis. We follow pharmaco-invasive strategy on most of our acute ST elevation myocardial infarction patients

Previously, studies had been done regarding strain before and after percutaneous intervention. But, our study was undertaken to evaluate the comparison between before and after thrombolysis with inj.streptokinase in terms of global longitudinal strain (GLS), left ventricular ejection fraction (LVEF) and wall motion score index (WMSI).

AIMS AND OBJECTIVES:

1. To assess longitudinal strain of individual segments and global LV systolic function using novel parameter 2D speckle tracking by automated functional imaging (AFI) in patients with acute ST–elevation myocardial infarction (STEMI).
2. To compare global longitudinal strain (GLS) with traditional parameters like wall motion score index(WMSI) and left ventricular ejection fraction (LVEF) by simpson' s method estimated with 2D TTE before and after thrombolysis.

METHODOLOGY:

This was a single centre, prospective observational study conducted in the cardiology department of Madurai government Rajaji hospital from march 2017 to may 2018 on acute ST-elevation myocardial infarction patients who were thrombolysed with inj. streptokinase. The study was commenced after approval from institutional ethics committee.

a) Inclusion criteria:

1. Patients admitted with the diagnosis of acute ST- elevation myocardial infarction.

b) Exclusion criteria:

1) Previous myocardial infarction.
2) Patients with unstable rhythm (atrial fibrillation, heart blocks, ventricular tachycardia) and cardiogenic shock.
3) Patients with associated valvular heart disease.
4) Patients on permanent pacemakers.
5) Patients with congenital heart disease.

STUDY POPULATION AND METHODOLOGY

This was a prospective observational study conducted in the department of cardiology at Government Rajaji hospital, Madurai during the period may 2017 to march 2018. The study was commenced after approval from institutional ethics committee. Acute ST-elevation myocardial infarction(STEMI) patients thrombolysed with inj. streptokinase were enrolled in the study.

Patients admitted to intensive coronary care unit of the department of cardiology, Govt. Rajaji hospital, Madurai with the diagnosis of acute ST elevation myocardial infarction were done detailed echocardiogram and strain analysis using GE vivid T8 machine in our department before and after thrombolysis with inj.streptokinase. Post thrombolysis Strain analysis was done between 12 to 24 hours after thrombolysis.

METHODS:

Complete patient profile was collected through structured study proforma. Presenting complaints of the patients admitted with acute myocardial infarction(AMI) who were thrombolysed were noted. Complete medical history of past illness such as diabetes mellitus (DM),systemic hypertension(SHT), chronic kidney disease(CKD), coronary artery disease(CAD) was recorded for each patient and enrolled in the study. History regarding personal habits such as smoking, alcohol intake and medication history were noted. Clinical examination was done along with detailed history for each patient enrolled in the study. Blood investigations such as random blood sugar, CPK –MB, lipid profile, blood urea and serum creatinine were done at the time of enrolment and the results were recorded . ECG and 2-D ECHO were done for all patients.

Patients were imaged in the left lateral decubitus position using a commercially available system (Vivid 8, General Electric-Vingmed,). Data acquisition was performed using a 3.5 MHz transducer, at a depth of 16 cm in the parasternal and apical views. Standard M-mode and 2D images were obtained during breath hold and saved in cine-loop format from three consecutive beats.

The LV end-systolic volume and end-diastolic volume were traced and LVEF was calculated using the biplane Simpson's technique. The LV was divided into 16 segments and each segment was analysed individually and scored based on its motion and systolic thickening (1-Normokinesis; 2-Hypokinesis; 3-Akinesis; 4-Dyskinesis). The WMSI was calculated as the sum of the segment scores divided by the number of segments scored.

Strain analysis

Peak systolic longitudinal strain was assessed on apical two-chamber, four-chamber, and long-axis views using speckle tracking by automated functional imaging (AFI) analysis[11]. This novel software analyses motion by tracking frame-to-frame movement of natural acoustic markers on standard ultrasonic images in two dimensions. All images were recorded with a frame rate of ≥40 fps for reliable analysis.

The LV endocardial border was manually traced at end-systole and the automatically created region of interest was adjusted to the thickness of the myocardium. Peak systolic strain were determined in all 18 segments from the three apical views. Global longitudinal strain(GLS) calculated as the average from all segments, as a measure of global LV systolic function.

Images for GLS are made in standard apical two-, three-, and four-chamber views and aortic valve closure (AVC) is used for timing of end-systole. When regional speckle tracking is suboptimal and recordings need to be rejected in more than two myocardial segments in a single view, the calculation of GLS was avoided. Normal GLS for most echocardiography systems is reported between 18 and 25% in healthy individuals, a variation, which in part may be explained by inter-software and inter- vendor variability. Global strain for the LV was provided by the software as the average value of the peak systolic longitudinal strain of the three apical views.

The Left anterior descending coronary artery(LAD) was considered to supply the anterior, antero-septal, apical, and mid-septal segments, the right coronary artery(RCA) to supply the inferior and basal septal segments, and the left circumflex Artery (LCX) to supply the posterior and lateral segments.

RESULTS

In our study, 50 cases of acute ST-elevation myocardial infarction , each 25 cases from AWMI and IWMI , thrombolysed with streptokinase were taken up for our study. Among 50 patients, 44 (88% ; AWMI:23 & IWMI: 21patients) were male and 6 (12%; AWMI:2 & IWMI: 4 patients) were female .Among the age group majority (32 patients; (64)%) are between 41-60years. The mean age of AWMI patients was 43 ±8.2 years and IWMI patients was 53±6.3 years (Figure-1).

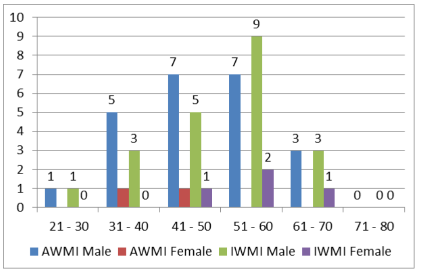

Figure-1.Age distribution.

With regarding the prevalence of conventional risk factors, diabetes (46%) and smoking (62%) were strong contributing factors both in the AWMI and IWMI patients. Various demographic and patient factors were depicted in Table- 1.

Table-1 Baseline characters & demography.

	AWMI (n=25)	IWMI (n=25)
Age (yrs)	43+8.2	53+6.3
Sex	23/2	21/4
Diabetes	13 (52%)	10(40%)
SHT	7(28%)	8(32%)
Dyslipidemia	6(24%)	3(12%)
Smoking	19(76%)	18(72%)

Assessment of WMSI among AWMI patients showed reduction from pre thrombolysis value of 1.6 to post thrombolysis value of 1.4. Similarly, WMSI among the IWMI patients reduced from pre thrombolysis value of 1.4 to post thrombolysis value of 1.2.(Table-2 & Figure-2)

Table – 2 WMSI before and after thrombolysis.

WMSI	Before thrombolysis		After thrombolysis	
	AWMI(=n)	IWMI(=n)	AWMI(=n)	IWMI(=n)
1.1 - 1.3	3	14	14	22
1.4 - 1.6	12	10	9	3
1.7 - 1.9	9	1	2	0
2.0 - 2.2	1	0	0	0

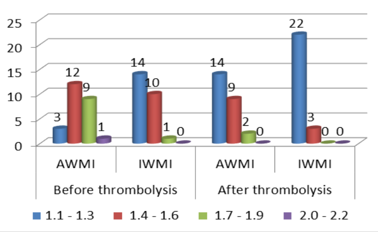

Figure- 2 .WMSI before and after thrombolysis

Assessment of global longitudinal strain (GLS) by speckle tracking echocardiography among AWMI patients showed improvement from pre thrombolysis average GLS value of -11.5 to post thrombolysis average GLS value of -14.2. Likewise, among the IWMI patients average GLS value improved from pre thrombolysis value of -13.7 to post thrombolysis value of -15.0.

Evaluation of average left ventricular ejection fraction(LVEF) as a measure of left ventricular systolic function among AWMI patients showed improvement from pre thrombolysis value of 41.4% to post thrombolysis value of 46.5%. Similarly, LVEF among the IWMI patients increased from pre thrombolysis value of 47.0% to post thrombolysis value of 51.0%.(Table-3)

Table - 3. GLS and LVEF before and after thrombolysis

GLS	Before thrombolysis		After thrombolysis			Before thrombolysis		After thrombolysis	
	AWMI (=n)	IWMI (=n)	AWMI (=n)	IWMI (=n)	LVEF	AWMI (=n)	IWMI (=n)	AWMI (=n)	IWMI (=n)
-7 to -9	4	1	0	0	20-30%	2	0	0	0
-10 to -12	10	3	5	1	31-40%	11	3	3	0
-13 to -15	9	19	10	13	41-50%	10	17	16	13
-16 to -18	2	2	10	11	51-60%	2	5	6	11
>-18	0	0	0	0	61-70%	0	0	0	1

Statistical Analysis:

Data analysis was done with the help of computer using epidemiological information package developed by centre for disease control, Atlanta. By using this software, range, frequencies, percentages, means, standard deviations, co-efficient of correlation and 'p'values were calculated. A 'p'value less than 0.05 is taken to denote significant relationship. If the co-efficient of correlation is more than or equal to ± 0.5, then there exists significant relationship between the two variables. A co-efficient of correlation 0.8 or more signifies that a very strong relationship exists between the two variables.

Table-4. Comparison of WMSI and GLS values in AWMI group

	BEFORE THROMBOLYSIS					AFTER THROMBOLYSIS				
SEGMENTS	WMSI		PSLS			WMSI		PSLS		
	Mean	SD	Mean	SD	**Correlation coefficient**	Mean	SD	Mean	SD	Correlation coefficient
Basal septum	1.228	0.106	-18.168	0.347	0.427	1.092	0.0909	-18.568	0.624	**0.707**
Mid septum	2.032	0.193	-9.412	0.647	0.067	1.308	0.108	-12.96	0.934	-0.273
Apical septum	2.42	0.168	-6.396	0.335	0.102	2.024	0.133	-9.412	0.835	0.134
Basal lat.	1.308	0.108	-16.484	0.933	**0.627**	1.012	0.117	-18.008	0.456	0.284
Mid. Lat	1.216	0.103	-14.216	0.867	**0.629**	1.108	0.0909	-15.616	0.756	**0.632**
Apical Lat.	1.592	0.272	-11.096	0.682	**0.656**	1.392	0.236	-14.816	0.743	0.028
Basal Anterior	1.612	0.267	-12.32	0.975	**0.648**	1.276	0.101	-15.588	0.694	0.402
Mid Anterior	2.172	0.179	-7.964	0.704	**0.642**	1.816	0.125	-12.96	0.956	-0.079
Apical anterior	2.088	0.179	-7.392	0.565	**0.628**	1.912	0.124	-11.092	0.749	-0.168
Apical interior	1.008	0.108	-18.492	0.521	-0.283	1.012	0.109	-18.412	0.462	**0.536**
Mid Inferior	1.016	0.111	-18.568	0.542	0.262	1.024	0.116	-18.808	0.577	**0.546**
Basal inferior	1.024	0.113	-18.38	0.5	0.412	1.016	0.121	-18.38	0.5	**0.695**
Apex	2.276	0.171	-5.216	0.717	0.237	2.276	0.171	-8.188	0.841	0.303

Global longitudinal strain was reduced in individual myocardial segments and uniformly normal in the non-ischaemic segments. Anterior wall MI patients group showed increased WMSI , reduced strain in mid, apical septum, LV apex, basal , mid and apical lateral as well as anterior segments. Statistical analysis of the data revealed positive and linear correlation (>0.50) between the values obtained by WMSI and strain in the basal , mid and apical lateral as well as anterior segments, whereas this linear and positive correlation was lacking in mid, apical septum and LV apex segments (Table- 4).

Similarly, inferior wall MI patients group showed increased WMSI , reduced Strain in the basal , mid and apical lateral as well as inferior segments. However, statistical analysis of the data revealed positive and linear correlation (>0.50) between the values obtained by WMSI and strain were seen in the basal septum, basal, mid and apical inferior segments only (Table- 5). This linear relation between these parameters was maintained among both AWMI and IWMI patients was present both pre and post thrombolysis.

Table-5. Comparison of WMSI and global longitudinal strain values in IWMI group

	BEFORE THROMBOLYSIS					AFTER THROMBOLYSIS				
	WMSI		PSLS			WMSI		PSLS		
SEGMENTS	Mean	SD	Mean	SD	Correlation coefficient	Mean	SD	Mean	SD	Correlation coefficient
Basal septum	1.808	0.119	-11.208	0.614	0.435	1.808	0.115	-12.584	0.85	**0.606**
Mid septum	1.388	0.237	-16.616	0.817	-0.145	1.108	0.0909	-17.024	0.752	0.137
Apical septum	1.012	0.117	-17.004	0.773	0.079	1.012	0.117	-17.18	0.628	-0.021
Basal lat.	1.224	0.0879	-16.392	0.818	**0.692**	1.096	0.114	-16.888	0.67	-0.049
Mid. Lat	1.208	0.0862	-15.4	0.775	**0.608**	1.1	0.108	-17.208	0.64	**0.576**
Apical Lat.	1.396	0.124	-13.508	0.893	**0.752**	1.104	0.106	-15.984	0.637	0.215
Basal Anterior	1.012	0.109	-19.968	1.182	**0.656**	1.012	0.117	-19.616	1.026	-0.155
Mid Anterior	1.024	0.116	-19.792	0.709	**0.672**	1.016	0.118	-20.12	0.979	0.057
Apical anterior	1.016	0.121	-18.384	0.697	**0.633**	1.004	0.117	-18.708	0.577	0.222
Apical interior	2.228	0.151	-8.4	0.798	0.045	1.904	0.165	-11.704	0.721	**0.592**
Mid Inferior	2.204	0.143	-6.708	0.493	-0.13	1.596	0.267	-10.608	0.617	**0.621**
Basal inferior	1.812	0.124	-6.952	0.641	0.082	1.288	0.0927	-10.408	0.73	**0.656**
Apex	1.012	0.101	-15.992	0.609	0.187	1.016	0.107	-17.104	1.011	0.271

Comparison between global longitudinal strain(GLS), Wall motion score index (WMSI) and Left ventricular ejection (LVEF) assessment by 2D echocardiography and 2D strain analysis both in AWMI and IWMI group pre thrombolysis and post thrombolysis and their linear correlation is depicted graphically in Figure 3 & 4.

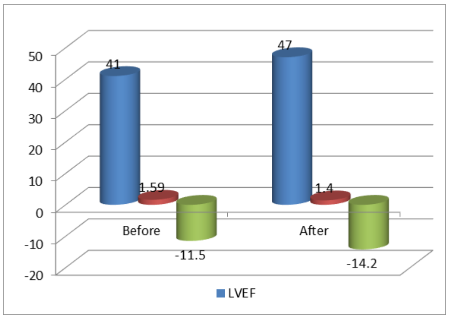

Figure -3 Comparison between global longitudinal strain (GLS), Wall motion score index (WMSI) and Left ventricular ejection (LVEF) in AWMI group.

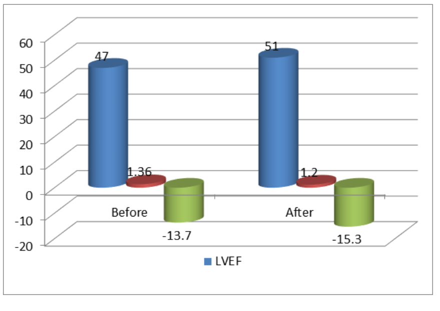

Figure-4 Comparison between global longitudinal strain(GLS), Wall motion score index (WMSI) and Left ventricular ejection (LVEF) in IWMI group.

Correlation between LVEF derived by biplane 2D simpson's method as well as speckle tracking method using AFI were also evaluated. Positive and linear correlation was present between these methods in both AWMI and IWMI patients. But this correlation was strongly positive in AWMI Patients group with a value of 0.78 and0.65 comparing to IWMI patients group with a value of 0.74 and 0.56 before and after thrombolysis respectively (Table- 6)

Individual risk factor analysis revealed that the presence or absence of a particular risk factor did not significantly affect the strain or WMSI as both groups revealed similar trends.("p" value > 0.05).

Table- 6 Comparison of LVEF by 2D and strain methods.

	Before thrombolysis			After thrombolysis		
Group	Simpson's	Strain	Correlation coefficient	Simpson's	Strain	Correlation coefficient
AWMI	41.416	39.148	**0.776**	46.516	44.620	**0.645**
IWMI	47.004	44.704	**0.740**	50.996	48.764	**0.556**

DISCUSSION

Strain imaging measures tissue deformation rather than tissue velocity[12]. Similar to traditional methods like wall motion score index and simpson's biplane method, strain imaging is able to detect regional wall motion abnormalities. Traditional methods are based on the principle of measuring tissue velocity. Tissue tethering is a disadvantage of these methods because of geometrical orientation of myocardial fibres. To overcome this disadvantage, strain imaging using peak longitudinal strain can be used to assess regional wall motion abnormality as a measure of left ventricular systolic function in acute MI patients[13].

As the tissue deforms three dimensionally, strain can be assessed in longitudinal , circumferential and radial planes. Measurement of longitudinal strain is more useful as well as reasonable, since the longitudinal fibres are the main fibres distributed in the sub endocardial region, the most susceptible region for ischaemia.

The global longitudinal strain(GLS) is assessed in our study, since it is the parameter correlated well with the regional left ventricular ejection fraction (LVEF). In our study left ventricular ejection fraction was estimated using echopac software based on tissue deformation of individual myocardial segments. The results of the study shows that the novel parameter global longitudinal strain(GLS) in the myocardial segments shows good linear correlation with the traditional parameters like WMSI and simpson's biplane LVEF method for assessing left ventricular systolic function both **pre thrombolysis and post thrombolysis.**

Even though overall correlation was seen between these parameters, there was no uniform correlation seen among individual segments both in AWMI and IWMI patients. mid septum, apical septum and apex in AWMI patients as well as mid and apical lateral segments in IWMI patients showed no significant statistical correlation both **pre thrombolysis and post thrombolysis.**

In the study by **Thor Edvardsen et al**[14] ,seventeen patients undergoing angioplasty of the left anterior descending coronary artery (LAD) were studied. Left ventricular longitudinal wall motion was assessed by TDE and SDE from the apical four-chamber view before, during and after angioplasty from multiple myocardial segments simultaneously**.** Segments not supplied by LAD remained unchanged. Tissue doppler echocardiography showed reduced velocities in all septal segments ($p < 0.05$) during angioplasty .Wall motion score index increased during ischemia (1.3 ± 0.4, $p < 0.05$). it was concluded that The new SDE approach might be a more accurate marker than TDE for detecting systolic regional myocardial dysfunction induced by LAD occlusion. The results of our study both **pre thrombolysis and post thrombolysis** correlates well with this study.

Study by **Lene Rosendhalet al**[15] it was shown that longitudinal peak strain detects a smaller risk area than visual assessment of wall motion in acute myocardial infarction. In this study ,It was tissue Doppler analysis (peak strain, displacement, mitral annular movement (MAM)) and compared with visual assessment for the study of the correlation of measurements of global, regional and segmental function with final infarct size and transmurality. It was concluded that in patients with acute STEMI, WMSI, EF, strain, and displacement showed significant changes between the pre- and post PCI exam. In a ROC analysis, strain had 64% sensitivity at 80% specificity and WMSI around 90% sensitivity at 80% specificity for the detection of scar with transmurality≥50% at follow-up.

Vartdal T et al[16]study on Early prediction of infarct size by strain Doppler echocardiography after coronary reperfusion found a good correlation was found between the global strain and total infarct size ($R = 0.77$, $p < 0.00001$). Furthermore, a clear inverse relationship was found between the segmental strain and the transmural extent of infarction in each segment ($R = 0.67$, $p < 0.0001$).

They have demonstrated that assessment of regional and global strain at 1.5 h after reperfusion therapy correlates with size and transmural extent of myocardial infarction and also found that the novel global strain parameter is a valuable predictor of the total extent of myocardial infarction and may therefore be an important clinical tool for risk stratification in the acute phase of myocardial infarction.

Sjoliet al[17] showed a correlation of 0.62 between global strain and infarct size measured within 3.5 hours after revascularisation. Global strain showed a higher correlation with the size of myocardial scar compared with LVEF. This result is in line with our study that the global longitudinal strain assessment was better correlating rather than the regional assessment both pre thrombolysis and post thrombolysis.

Global longitudinal strain by speckle tracking for infarct size estimation **by Kim Munk et al**[18] confirmed that assessment infarct size by echocardiography on day 1 after pPCI was superior with GLS and WMSI compared with LVEF and ESVI; GLS from a 30-day follow-up echocardiogram was comparable with LVEF, but WMSI provided a more precise IS estimate. At this stage, GLS contained significant additional information to LVEF and ESVI but not to WMSI regarding IS. The present data suggest the use of GLS in the early phase after STEMI, whereas the role of GLS on follow-up seems less obvious. Further studies are needed to clarify the prognostic role of GLS in patients with STEMI

Louisa Antoni1et al[19] did a study on Prognostic importance of strain and strain rate after acute myocardial infarction study of 659 patients after AMI. Patients were evaluated using echocardiography to assess LV function with traditional parameters and strain and strain rate. In their study, Strain was independently related to all endpoints. Patients with global strain and strain rate higher than -15.1% and -1.06 s^{-1} demonstrated HRs of 4.5 (95% CI 2.1–9.7) and 4.4 (95% CI 2.0–9.5) for all-cause mortality, respectively and their conclusion was that Strain and strain rate provide strong prognostic information in patients after AMI. These novel parameters were superior to LVEF and WMSI in the risk stratification for long-term outcome. This study reiterates the importance of strain imaging in acute myocardial infarction patients

LIMITATIONS

1. Even though positive correlation(> 0.5) was seen in in most of the variables compared, the strong positive correlation was not uniformly seen among individual segments.
2. The 17 segment model proposed by American college of cardiology could not be displayed in a bull's eye blot due to non availability of such software in our machine.
3. Angiographic correlation was not done.
4. Our study was a single point study and follow up of regional and overall LV function was not compared.

CONCLUSION

Echocardiography, done using two methods – subjective assessment of wall motion using 2D echocardiography and left ventricular ejection fraction as well as objective measurement of deformation (strain) by 2D speckle tracking echocardiography detected myocardial segments involved as well as overall left ventricular function. These parameters traditional WMSI and novel global longitudinal strain correlated with each other both pre thrombolysis and post thrombolysis with regards to regional as well as global LV function.

Analysis based on coefficient of correlation showed global longitudinal strain assessment in our study pre thrombolysis and post thrombolysis provides stronger prognostic information in patients after AMI and these novel parameters were superior to LVEF and WMSI in the risk stratification in AMI in the risk stratification for long-term outcome.

Our study has shown that in acute ST elevation MI , global longitudinal strain(GLS) by STE is more sensitive than LVEF as a marker of LV dysfunction both pre and post thrombolysis.
The strain imaging methodology is still undergoing development and further clinical trials are needed to determine if clinical decisions based on strain imaging results in better outcome.

With this important limitation in mind, Global longitudinal strain estimation (GLS) using automated functional imaging (AFI) by 2D echocardiography may be applied clinically as a supplementary diagnostic and prognostic method in acute myocardial infarction (AMI) both pre and post thrombolysis

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