Prognostic Value of Global Longitudinal Speckle-Tracking Strain after Coronary Revascularization in Patients with Non-ST Elevation Myocardial Infarction

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ABSTRACT

Background: Acute myocardial ischemia is a hallmark of myocardial infarction without ST-segment elevation (NSTEMI). Using wall motion analysis and left ventricular ejection fraction, conventional echocardiography is frequently used to assess cardiac function. However, this technique may not be sufficient to explore all the complex features of NSTEMI. Speckle tracking echocardiography has been used in the context of non-ST-segment elevation acute coronary syndrome (NSTE-ACS) multiple times in recent years.

Objective: The aim of the current study was to ascertain whether there is a global longitudinal speckle tracking strain in NSTEMI patients following coronary revascularization could be a prognostic indicator of LV remodeling.

Patients and methods: A cross-sectional study was conducted at Echocardiography and Catheterization Lab Unit of Zagazig University Hospital, on 82 patients presenting with moderate risk NSTEMI and who were candidates for early invasive coronary angiography. All patients were subjected to speckle tracking echocardiography. The patients were divided into 2 groups based on the percentage changes in LVED volume at the time of admission and the six-month follow-up. Those who experienced a minimum 15% increase in LV end-diastolic volume but no improvement in LV function were said to have LV remodeling.

Results: For the variables EF, WMSI, LVEDV, LVESV, declaration time, and GLS upon admission, between the 2 groups, there were observable differences. At six months, there was a substantial difference in the EF, WMSI, LVEDV, and LVESV between the 2 groups. GLS's cut-off value for predicting LV remodeling was -14.65%.

Conclusion: Individuals with NSTEMI who underwent PCI or CABG treatment showed signs of remodeling of the LV in 48.8% of these patients. GLS at a cut-off value -14.65 %, EF at a cut-off value 50.5%, and Least vessel diameter at a cut-off value 2mm were distinct indicators of LV remodeling in patients with NSTEMI revascularized by PCI or CABG.

Keywords: Generalized longitudinal strain, Revascularization, Speckle-tracking, NSTEMI, Cross sectional study, Zagazig University.

INTRODUCTION

Acute coronary syndrome (ACS) can be divided into subgroups of ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina. Cardiomyocyte necrosis, which is non-ST-segment elevation myocardial infarction (NSTEMI) or, less frequently, myocardial ischemia without cell loss, is the pathological correlate at the myocardial level (unstable angina) [(1)].

Studies have indicated that when the period between angiography and revascularization rises in NSTEMI patients. Myocardial function diminishes and the damage becomes permanent, particularly in those who have coronaries occlusion on angiography [(2)].

Also, it is well recognized that injured myocardial segments can evolve in multiple ways following acute coronary syndrome revascularization therapy, including functional recovery or irreversible negative remodeling, both of which have different prognostic consequences [(3)].

Several studies have demonstrated that one of the most significant indicators of left ventricular (LV) systolic functional recovery following myocardial infarction is the amount of viable myocardial tissue [(4)].

Strain Rate imaging, one of many echocardiographic techniques, has become popular because of its capacity to identify time, contractility, and myocardial deformation in individuals with various heart illnesses. Doppler angle of incidence, however, severely restricts Doppler strain measurements [(5)].

Speckle tracking two-dimensional strain echocardiography (2DSE), a novel technique, quantifies regional LV function from standard gray-scale 2D echocardiographic images by estimating myocardial strain using an Automated Imaging Function (AFI), independent of angle of incidence. It has recently been validated against sonomicrometry and tagged magnetic resonance imaging [(6)].

Analyzing specific to assess LV function, myocardial wall portions appear to be more useful than the total myocardium. The new indicator, ventricular function's global longitudinal strain (GLS) that outperforms traditional ejection fraction (EF) measurements, is likely a result of the assessment's high degree of automation. [(7)]. Moreover, studies have shown showed Global longitudinal strain is present in ischemic heart disease both acutely and chronically (GLS), as assessed by 2DSE, is a very reliable indicator of the size of myocardial infarcts [(8)].

The aim of the current study was to ascertain whether there is a global longitudinal speckle tracking strain in NSTEMI patients following coronary

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revascularization could be a prognostic indicator of LV remodeling.

PATIENTS AND METHODS

A cross-sectional study was conducted at Echocardiography and Catheterization Lab Unit of Zagazig University Hospital, from January 2020 to August 2022.

We recruited 82 patients presenting with moderate risk NSTEMI (Grace risk score 109-140) and who were candidates for early invasive coronary angiography. According to recent worldwide recommendations, all patients who received optimum anti-ischemic therapy were covered by the research.

The study's exclusion criteria were those with dilated cardiomyopathy, prior myocardial infarction, atrial fibrillation, severe valvulopathy, inadequate echocardiographic window, normal systolic performance in the region and those who later received coronary artery bypass grafting.

Participants were divided into 2 groups based on the proportion of the LVED and EF volumes' changes: Group I (n=40): Negative LV remodeling (Remodeled) and Group II (n=42): Positive LV remodeling (Non-remodeled).

The following tests were performed on all patients: thorough history-taking, complete clinical examination of patients and NYHA class assessment, standard 12-lead surface ECG, grace score calculation, laboratory investigations including CBC, random blood sugar at admission, serum Creatinine, BNP at admission, high sensitivity troponin I at admission.

Echocardiography: All patients were subjected to speckle tracking echocardiography.

Two exams were conducted: the first at the time of admission and the second six months after revascularization. Using the Vivid 9 system, a resting echocardiography investigation was carried out (GE Ultrasound, Horten, Norway). The measurements taken were as follows:

1. **Ejection fraction (EF):** Using the modified Simpson biplane approach from the apical 4-views, the LV volumes and EF were evaluated. Moreover, the formula is used to calculate it: EF= [(EDV-ESV)∕EDV] ×100. Normally it is 50- 70 % [9].
2. **Pulsed Doppler of mitral inflow:** Stunning 4CV Do the following measurements while holding between the tips of the mitral leaflets, in a 1-3 mm PW Doppler sample volume, with the Doppler beam pointed in the inflow direction: peak early E wave, peak early diastolic velocity, and peak late atrial filling rate (relative contribution of early and late atrial filling), and deceleration time [10].
3. **Continuous wave Doppler of tricuspid inflow:** utilizing the modified Bernoulli equation for tricuspid regurgitation peak velocity, the maximum estimate pulmonary artery systolic pressure (PASP).
4. **Wall motion score index (WMSI):** The left ventricle's 16 segments will be modelled for the evaluation of sub-volumes, strain, and wall motion score. There will be graded segments (1 = normokinetic, 2 = hypokinetic, 3 = akinetic, or 4 = dyskinetic) based on arbitrary measurements of the left ventricular thickness during systole and the level of wall motion. By dividing the entire segment score ratings by the total number of segments, the wall motion score index was obtained evaluated.
5. **Global longitudinal strain (GLS) using the speckle tracking technique** was employing the same echo system Vivid 9 system, only at entrance time (GE Ultrasound, Horten, Norway). Utilizing the three, four, and two chamber perspectives at the apex. For each LV section, longitudinal strain was calculated. The three The LV endocardial border was drawn in the apical images and manually adjusted to the thickness of the myocardium using the optimal frame for endocardial identification and the automatically generated region of interest. If tracking quality was consistently poor after adjusting the region of interest, segments were eliminated. The deformation parameters were then automatically produced into quantitative and graphical bull's eye representations for each LV segment. Then, end-systole was determined by using the time interval between the R wave and this automatically timed time point. Using the apical long-axis image, it was possible to the closure of the aortic valve. [11].
6. **Coronary Angiography:** Full revascularization to be performed on all patients using the usual Judkins procedure, either by: **PCI** of the problematic coronary artery disease and other problematic arteries (TIMI-flow grades will be evaluated following the surgery) and The culprit lesion, number of diseased vessels, least vessel diameter and thrombus containing lesions will be detected) or c**oronary artery bypass grafting (CABG):** Number of grafted vessels were detected.

Follow up Echocardiography after 6 months: Evaluation of LV volumes, LVEF, and WMSI again. Cardiovascular death, non-fatal strokes, non-fatal myocardial infarctions, the requirement for coronary revascularization and heart failure hospitalization were all important adverse cardiac events that were documented.

Grouping of the patients:

The patients were separated into two groups based on the percentage changes in LVED volume at the time of admission and the six-month follow-up. Those who experienced a minimum 15% increase in LV end-diastolic volume but no improvement in LV function (LV EF of at least 5%) were said to have LV remodeling.

Ethics Approval:

This study was ethically approved by the Institutional Review Board of the Faculty of Medicine, Zagazig University. Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Statistical Analysis

The collected data were introduced and statistically analyzed by utilizing the Statistical Package for Social Sciences (SPSS) version 27 for windows. Qualitative data were defined as numbers and percentages. Chi-Square test and Fisher's exact test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Normal distribution of variables was described as mean and standard deviation (SD), and independent sample t-test/ Mann-Whitney U test was used for comparison between groups. P value ≤0.05 was considered to be statistically significant.

RESULTS

There was a statistically significant difference in age, hypertension, diabetes, and dyslipidemia across the 2 study groups. There was a statistically significant difference with relation to NYHA classification and Grace Score (**Table 1**).

Table (1): Baseline data of the study groups.

Groups / Demographic data and risk factors	Group (I) (- ve LV remodeling) (n =40)	Group (II) (+ve LV remodeling) (n =42)	Test Value	P-value
Age (years) Mean ± SD	58.42 ± 9.35	53.16 ± 9.66	2.50	**<0.05**
Gender				
Male n (%)	28 (70%)	33 (78.6%)		
Female n (%)	12 (30%)	9 (21.4%)	0.79	>0.05
HTN n (%)	30 (75%)	19 (45.2%)	7.54	**<0.05**
DM n (%)	32 (80%)	21 (50%)	8.06	**<0.05**
Smoking n (%)	22 (55%)	26 (61.9%)	0.40	>0.05
+ ve Family history n (%)	8 (20%)	8 (19%)	0.012	>0.05
Dyslipidemia n (%)	27 (67.5%)	19 (45.2%)	4.12	**<0.05**
NYHA				
I n (%)	7 (17.5%)	26 (61.9%)	19.238	**<0.05**
II n (%)	31 (77.5%)	16 (38.1%)		
III n (%)	2 (5%)	0 (0%)		
Grace Score	129.82 ± 4.79	120.38 ± 7.85	6.54	**<0.05**

HTN: Hypertension, DM: Diabetes, SD: Standard deviation

There was statistical non-significant difference between the study groups regarding method of revascularization (Table 2).

Table (2): Revascularization strategies between the study groups.

Groups / Revascularization	Group (I) (- ve LV remodeling) (n=40)	Group (II) (+ve LV remodeling) (n=42)	Test Value	P-value
PCI n (%)	28 (70%)	24 (57.1%)	1.46	>0.05
CABG n (%)	12 (30%)	18 (42.9%)		

There was non-significant difference between the study groups regarding culprit vessel. There was non-significant difference between the study groups regarding culprit vessel. This difference was significant statistically regarding number of diseased vessels (**Table 3**).

Table (3): Culprit vessel, thrombus containing lesion and number of diseased vessels in the study group.

Groups / Culprit vessel	Group (I) (- ve LV remodeling) (n=40)	Group (II) (+ve LV remodeling) (n=42)	Test Value	P-value
No culprit	18 (45%)	19 (45.24%)	5.342	>0.05
LAD	16 (40%)	9 (21.43%)		
LCX	3 (7.5%)	6 (14.29%)		
RCA	3 (7.5%)	8 (19.05%)		
Thrombus containing lesion				
No thrombus	23 (57.5%)	27 (64.29%)	5.219	>0.05 0.156
LAD	12 (30%)	5 (11.9%)		
LCX	3(7.5%)	4 (9.52%)		
RCA	2 (5%)	6 (14.29%)		
Number of diseased vessels	2.88 ± 0.56	2.31 ± 0.92	3.32	**<0.05**

There were statistically significant differences regarding least vessel diameter and Post PCI TIMI grade (**Table 4**).

Table (4): Least vessel diameter, Post PCI TIMI grade in the study group.

Groups / Least vessel diameter	Group (I) (n=40)	Group (II) (n=42)	Test Value	P-value
	Mean ± SD	**Mean ± SD**		
Least vessel diameter	1.83 ± 0.35	2.08 ± 0.25	3.89	**<0.05**
TIMI after PCI	2.68 ± 0.67	3.0 ± 0.0	2.35	**<0.05**

There were statistically significant differences regarding Hb, creatinine, RBS and BNP between both groups (**Table 5**).

Table (5): Laboratory results of the study groups.

Groups / Laboratory results	Group (I) (n=40)	Group (II) (n=42)	Test Value	P-value
	Mean ± SD	**Mean ± SD**		
Haemoglobin g/L	12.95 ± 1.69	14.17 ± 1.39	3.57	**<0.05**
WBCs	8.37 ± 1.67	7.85 ± 2.20	1.19	>0.05
Platelets	289.97 ± 73.99	301.8 ± 75.27	0.72	>0.05
Creatinine umol/L Md (IQR)	94.5 (81.25-107.75)	83 (75-96)	2.66	**<0.05**
AdmissionRBS mmol/L	8.25 ± 3.37	10.41 ± 3.7	2.75	**<0.05**
HsTn I at admission ng/L	501.5 (107.25-1175)	161 (75.75-1143)	1.27	>0.05
BNP pg/mL Md (IQR)	414 (230.25-637.5)	172.5(91.5-342.5)	3.54	**<0.05**

There were significant difference between both groups regarding EF, WMSI, LVEDV, LVESV, declaration time and GLS at admission (**Table 6**).

Table (6): Echo parameters at admission between the study groups.

Groups / Echo finding	Group (I) (n=40)	Group (II) (n =42)	Test Value	P-value
	Mean ± SD	**Mean ± SD**		
EF%	44.35 ± 6.8	56.19 ± 8.563	6.91	**<0.05**
WMSI	1.45 ± 0.28	1.16 ± 0.148	5.95	**<0.05**
LVED V Md (IQR)	134 (121.25-144.53)	107.5 (96.75-121.75)	3.83	**<0.05**
LVES V Md (IQR)	50 (41-64.5)	42 (34.75-46.25)	3.26	**<0.05**
E	0.68 ± 0.181	0.72 ± 0.126	1.07	>0.05
A	0.75 ± 0.204	0.67 ± 0.214	1.75	>0.05
E/A	1.03 ± 0.640	1.17 ± 0.398	1.16	>0.05
Decelration time Md (IQR)	251 (179.5-279)	218 (174.75-248.5)	2.28	**<0.05**
PASP	30.68 ± 8.58	27.79 ± 5.068	1.87	>0.05
GLS	12.38 ± 2.48	16.81 ± 1.92	9.055	**<0.05**

There was significant difference between both groups regarding EF, WMSI, LVEDV, and LVESV after 6 months (**Table 7**).

Table (7): Echo parameters after 6 months between the study groups.

Groups / Echo finding after 6 months	Group (I) (n=40)	Group (II) (n=42)	Test Value	P-value
	Mean ± SD	Mean ± SD		
EF%	42.93 ± 6.37	59.48 ± 6.41	11.719	**<0.05**
WMSI	1.39 ± 0.24	1.06 ± 0.099	8.04	**<0.05**
LVED V	166.5 (138.75-179.5)	86 (76.5-94.25)	5.513	**<0.05**
LVES V	55 (45.25-66.25)	38 (31.0-41.25)	3.363	**<0.05**

There was no statistical significant difference between both groups regarding MACE (**Table 8**).

Table (8): Individual events of MACE during 6 months follow up between study groups

Groups / MACE during 6 months follow up	Group (I) (- ve LV remodeling) (n=40)	Group (II) (+ve LV remodeling) (n=42)	Test Value	P-value
Total death	No statistics are computed because Mortality is a constant.			
Myocardial infarction n (%)	6 **(**15%**)**	3 **(**7.1%**)**	**FET**	>0.05
Coronary revascularization n (%)	5 **(**12.5%**)**	3 **(**7.1%**)**	**FET**	>0.05
Stroke n (%)	2 (5%)	0 (0%)	**FET**	>0.05
Hospitalization cause of heart failure n (%)	10 **(**25%**)**	4 **(**9.5%**)**	**FET**	>0.05

DISCUSSION

Age differences between the study groups were statistically significant, with mean ages of 58.42 in Group (I) Vs 53.16 in Group (II). This was in agreement with Group (II) finding's that age is linked to a kind of LV remodeling characterized by an elevated systolic and diastolic myocardial dysfunction are present along with an elevated mass-to-volume ratio, which is not accompanied by a maintained ejection fraction Significant cardiovascular risk is associated with this ventricular remodeling pattern, especially when it appears earlier in life [(12)].

Also, our investigation revealed a difference in hypertension among the research groups that is statistically significant. **Nadruz** [(13)], a complicated combination of various hemodynamic and non-hemodynamic factors causes LV remodeling, which is typically observed in hypertensive individuals.

The levels of diabetes mellitus in the study groups were significantly different in the current investigation. This is consistent with **Shah *et al.*** [(14)] They found that diabetes individuals had higher After a high-risk MI, those with lower baseline LV mass index, relative wall thickness, left atrial volume index (LAVi), as well as bigger left atrial enlargement at 20-month follow-up, had a higher chance of passing away or experiencing heart failure (HF). Our results suggest that the long-term increase in LV diastolic pressure following a MI and larger baseline concentric remodeling in diabetes patients may partially mediate this risk.

According to our study, the levels of dyslipidemia in the two groups varied statistically significantly, which is consistent with prior findings. **Yoon *et al.*** [(15)] shown that in individuals with acute myocardial infarction, dyslipidemia, reduced systolic function, and elevated WMSI are independent variables that contribute to left ventricular remodeling (AMI).

According to the current study groups, there was no overt gender difference. This is consistent with the research of **van der Bijl *et al.*** [(16)], who found that Similar rates of long-term survival and left ventricular post-infarct remodeling were seen in men and women who received primary PCI and the proper post-STEMI treatment.

There was no observable difference in smoking between the two groups in our investigation, which concurs with the outcomes of **D'Andrea *et al.*** [(17)], study revealed no differences between those who had a modified left ventricle and those who had not following a recent NSTEMI.

In our investigation, There was no discernible difference in the revascularization between the two trial groups method (PCI vs CABG). This observation is consistent with those of **Peng *et al.*** [(18)]**;** They examined 993 individuals with ischemic HFrEF and discovered no relationship between LVEF improvement and the revascularization technique.

Our research found demonstrated the impact that did not differ statistically significantly from culprit vessel and the thrombus-containing lesion on LV remodeling between the two study groups. This was in line with findings from **Lustosa *et al.*** [19] It shown that the culprit vessel had no discernible effect on how people with myocardial infarction's LV change.

In our research, the number of coronary arteries with atherosclerosis varied significantly between the two study groups, with **Bolognese *et al.*** [20] who examined how the heart changed after primary angioplasty in 284 AMI patients who received primary PCI and found that high peak Creatine Kinase (CK) values and the presence of multi-vessel coronary artery disease (CAD) were independent predictors of late (after six months) LV dilatation (CAD).

With a mean of 1.83 0.35 in the remodeled group against 2.08 0.25 in the non-remodeled group, our study exhibited at least one statistically significant difference between the two study groups coronary vessel diameter, which was consistent with **Zhou *et al.*** [21] They came to the conclusion that the severity of CAD is inversely correlated with sizes of coronary arteries.

Between the two trial groups in our investigation's TIMI there was a significant statistical difference flow after PCI. This was consistent with **Karwowski *et al.*** [22] who came to the conclusion that NSTEMI patients treated with percutaneous coronary revascularization only benefit from reaching final TIMI 3 in IRA.

Also, our investigation revealed a statistically significant variation in the research groups' hemoglobin levels, which was consistent with **Park *et al.*** [23]; They discovered that a low hemoglobin content was strongly linked to an increased incidence of LVH, negative alterations in the heart geometry, and LV remodeling in a large Korean population.

Our analysis revealed across the two research groups that there was a notable variation in blood creatinine levels, which was consistent with **Cioffi *et al.*** findings [24] that individuals with low serum creatinine were related with reverse LV remodeling in elderly patients.

Our investigation revealed a substantial difference in admission random blood sugar levels between the study groups, which was consistent with **Sabry *et al.*** [25] who investigated Acute hyperglycemia According to studies on the impact of hyperglycemia on the outcomes of patients with acute myocardial infarction, is linked to adverse effects on LV functions, notably progressive diastolic dysfunction and impairment of the heart's pumping ability (LV remodeling).

No statistically significant changes in the admission high sensitivity troponin levels between the groups were found in our research the study groups. This fit in line with **Reinstadler *et al.*** [26] who discovered that in Sixty-six patients who underwent With the exception of After receiving primary percutaneous coronary intervention (PCI) for their initial STEMI, the left ventricular ejection fraction and infarct size were substantially linked with admission hs-cTnT, all single time points, and peak hs-cTnT concentrations.

The results of our investigation, which examined the function of BNP, revealed a substantial between the two study groups. The heart releases natriuretic peptides when the ventricles are strained and full to capacity. It has been proposed that the marker B-type natriuretic peptide (BNP) can be utilized to determine the severity of systolic left ventricular dysfunction as well as to differentiate between acute and chronic left ventricular dysfunction the past 10 years, as stated by **Potocki *et al.*** [27]**.**

Our investigation revealed a statistically significant difference in EF, EDV, and other variables between the study group ESV regarding echocardiography findings at the time of admission. While EF was higher in the non-remodeled group, EDV and EDV were higher in individuals who experienced LV remodeling. This outcome was consistent with **Aboelkasem *et al.*** [28]**.**

In our study, the group that had LV remodeling had significantly higher WMSI values at both admission and after six months of follow-up. This didn't line up with **D'Andrea *et al.*** [17] who did not observe a substantial change, while it was consistent with **Bastawy *et al.*** [29]

Our investigation, however, revealed a substantial difference in deceleration time that was consistent with **Cerisano *et al.*** [30] who investigated the relationship between early evaluation of Doppler-derived mitral deceleration time (DT), a measurement of LV compliance and filling, and prediction of progressive LV dilatation following acute myocardial infarction (AMI), and found that DT was the most effective predictor of LVEDVI changes at 6 months (P=0.02).

For E, A, E/A, and PASP, There was no difference between the two groups in the current investigation, and this finding was consistent with **D'Andrea *et al.*** [17]**.**

The findings of this study confirm the value of 2DSE in assessing LV longitudinal global and local myocardial deformation in individuals receiving PCI for recent NSTEMI.

Since it has been established that the first changed function after an acute coronary crisis is longitudinal strain (ACS) attributable to early myocardial subendocardial layer necrosis fibers, the current study evaluated the relevance of a novel 2D-STE derived GLS in remodeling prediction [31].

Our investigation found a significant disparity between the two groups' GLS values with Group I experiencing remodeling seeing a lower GLS value **D'Andrea *et al.*** [17] who discovered a substantial difference in GLS between his study groups.

The high positive connection between GLS and LV remodeling also contributed to this conclusion (r= 0.643, P<0.001), this was concordant with **Bonios *et***

al. [32] who discovered an effective link between GLS and LV remodeling (r=0.56, P<0.001).

In contrast, this was at odds with **Sugano *et al.*** [33] who noticed no alteration to GLS between his study groups, which could be explained by the low mean GLS values in his groups that were cross-matched.

The GLS cut off value that can significantly predict LV remodeling, as well, was shown to be 14.65 % (AUC 0.924 at 95% CI ranged from 0.870 to 0.978, sensitivity= 78.6%, specificity= 82.5%). **D'Andrea *et al.*** [17] We found that the most significant predictor of remodeling was the average LV peak systolic GLS at baseline echocardiographic examination, which was GLS –12% (Sensitivity 84.8% and Specificity 87.8%) .

According to the present study, EDV, ESV, and EF were statistically significantly different amongst the study groups **D'Andrea *et al.*** [17] who, after a six-month follow-up, demonstrated a substantial difference between his study groups. Also, our study demonstrated a substantial difference in WMSI after a 6-month follow-up.

Our analysis revealed no discernible variations in MACE across the research groups, which was consistent with **Kim *et al.*** [34] who found no connection between LV remodeling and a serious unfavorable cardiovascular outcome in STEMI patients with full revascularization.

CONCLUSION

Individuals with NSTEMI who underwent PCI or CABG treatment showed signs of remodeling of the LV in 48.8% of these patients. GLS at a cut-off value -14.65 %, EF at a cut-off value 50.5%, and Least vessel diameter at a cut-off value 2mm were distinct indicators of LV remodeling in NSTEMI patients who underwent PCI or CABG revascularization.

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