Is combined myocardial performance index and tricuspid annular plane systolic excursion a better predictive estimator than each of them alone in patients with inferior ST-elevation myocardial infarction?

İnferiyor ST yükselmeli miyokart enfarktüslü hastalarda miyokart performans indeksiyle triküspit halkası düzleminin sistolik yer değiştirmesinin birlikteliği, her birinin tek başına kullanımına göre daha iyi bir öngördürücü müdür?

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ABSTRACT

Objectives: We aimed to assess the combined estimator of left ventricular (LV) myocardial performance index (MPI) and tricuspid annular plane systolic excursion (TAPSE) as a pooled independent predictive factor for hospital mortality and one-year mortality and re-hospitalization in patients with primary LV inferior ST segment elevation myocardial infarction (STEMI).

Study design: We prospectively studied 221 consecutive patients (189 males, 32 females; mean age 58.2±4.5; range 38 to 72 years) with primary LV inferior STEMI. Standard echocardiography and Doppler myocardial imaging were used within 24 hours of onset of myocardial infarction to measure LV MPI and TAPSE. Based on LV MPI and TAPSE values, all subjects were categorized into two groups: Group 1 with LV MPI ≥0.55 and TAPSE ≤14 mm (n=78) and Group 2 with the remaining patients (n=143). Patients were followed up for the endpoints of hospital mortality, one-year mortality and one-year re-hospitalization.

Results: Hospital mortality (17.9% *vs.* 6.3%, adjusted odds ratio [OR_{adj}] 3.26, p<0.01) one-year mortality (39.1% *vs.* 14.2%, OR_{adj} 3.88, p<0.001) and one-year re-hospitalization rates (50.0% *vs.* 18.7%, OR_{adj} 4.36, p<0.001) were significantly higher in Group 1 than in Group 2. Compared with OR for LV MPI ≥0.55 *vs.* LV MPI <0.55 or TAPSE ≤14 mm *vs.* TAPSE >14 mm alone, the pooled parameter of LV MPI ≥0.55 and TAPSE ≤14 mm was shown to be the better predictive estimator, with higher OR and lower significance p-values.

Conclusion: In primary LV inferior STEMI patients, combined LV MPI ≥0.55 and TAPSE ≤14 mm was seen to be a more valuable prognostic estimator than LV MPI ≥0.55 or TAPSE ≤14 mm alone for stratifying risky patients.

ÖZET

Amaç: Birincil inferiyor ST segment yükselmeli miyokart enfarktüsü (STYME) hastalarında, sol ventrikül (SV) miyokart performans indeksiyle (MPİ) triküspit halkası düzlemi sistolik yer değiştirmesinin (TAPSE) birlikte değerlendirilmesinin hastane mortalitesi, bir yıllık mortalite ve yeniden hastaneye yatış açısından bağımsız bir öngördürücü faktör olup olmadığı araştırıldı.

Çalışma planı: Birincil inferiyor STYME'li 221 ardışık hasta (189 erkek, 32 kadın; ort. yaş 58.2±4.5; dağılım 38-72) ileriye dönük olarak incelendi. Miyokart enfarktüsü atağından sonraki 24 saat içinde MPİ ve TAPSE'yi ölçmek için standart ekokardiyografi ve Doppler miyokart görüntüleme yöntemleri kullanıldı. SV-MPİ ve TAPSE değerleri kullanılarak deneklerin tümü iki grupta kategorize edildi. Grup 1: SV-MPİ ≥0.55 ve TAPSE ≤14 mm (n=78) olan hastalar, Grup 2: Geri kalan hastalar (n=143). Hastalar hastane mortalitesi, bir yıllık mortalite ve bir yılda yeniden hastaneye yatış gibi son noktalar açısından izlendi.

Bulgular: Hastane mortalitesi (%17.9 ve %6.3, düzeltilmiş odds oranı [$OR_{düz}$] 3.26, p<0.01), bir yıllık mortalite (%39.1 ve %14.2, $OR_{düz}$ 3.88, p<0.001) ve yeniden hastaneye yatırılma oranları (%50.0 ve %18.7, $OR_{düz}$ 4.36, p<0.001) Grup 1'de Grup 2'ye göre anlamlı derecede yüksekti. Yalnız başına SV-MPİ ≥0.55 ile SV-MPİ <0.55 değerlerinin veya TAPSE ≤14 mm ile TAPSE >14 mm'nin OR'lerinin karşılaştırmasına göre, MPİ ≥0.55 ve TAPSE ≤14 mm birlikteliği daha yüksek olasılık oranı ve daha düşük anlamlılıktaki p değerleri ile üç oran açısından da daha iyi bir öngördürücü faktör olduğu gösterilmiştir.

Sonuç: Birincil inferiyor STYME'li hastaların riskli olanların sınıflandırılmasında, tek başına SV-MPİ ≥0.55 veya TAPSE ≤14 mm ölçütlerine göre SV-MPİ ≥0.55 ve TAPSE ≤14 mm'nin birlikte kullanımının daha değerli bir prognostik faktör olduğu görünmektedir.

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Clinical outcomes in patients after acute myocardial infarction (AMI) are determined by the interaction of a large number of factors. Besides the importance of clinical parameters, recent studies have demonstrated the usefulness of standard two-dimensional (2D) echocardiography and Doppler myocardial imaging (DMI) for identification of patients who are at risk of an adverse outcome.[1] These investigations revealed that the presence of left ventricular (LV) dysfunction on echocardiography shortly after AMI is one of the most important prognostic parameters indicating worse long-term outcomes.[2] From Doppler criteria, LV myocardial performance index (MPI) - a numeric value obtained by using cardiac time intervals - is currently accepted as a useful global estimator of both systolic and diastolic myocardial function of the LV.[3] Our recent study suggested that LV MPI ≥0.55 is associated with late adverse cardiac outcomes - one-year cardiac death and re-hospitalization - in patients with primary LV inferior ST segment elevation myocardial infarction (STEMI).[4]

Abbreviations:

2D	*Two-dimensional*
AH	*Arterial hypertension*
AMI	*Acute myocardial infarction*
COPD	*Chronic obstructive pulmonary disease*
DM	*Diabetes mellitus*
DMI	*Doppler myocardial imaging*
ET	*Ejection time*
IVCT	*Isovolumic contraction time*
IVRT	*Isovolumic relaxation time*
LV	*Left ventricular*
LVEF	*Left ventricular ejection fraction*
MPI	*Myocardial performance index*
OR_{adj}	*Adjusted odds ratio*
RV	*Right ventricular*
STEMI	*ST segment elevation myocardial infarction*
TAPSE	*Tricuspid annular plane systolic excursion*

The relevance of right ventricular (RV) function, on the other hand, is poorly defined in AMI patients.[5] However, involvement of the RV during inferior AMI has been defined recently by several authors as a strong predictor of hospital mortality.[6-8] Currently, tricuspid annular plane systolic excursion (TAPSE) - a distance of systolic excursion of the RV annular segment along its longitudinal plane from a standard apical 4-chamber window - is widely recognized as a clinically useful and feasible marker of RV dysfunction, and has been proven to be a valuable prognostic estimator in various cardiac diseases.[9] We showed that TAPSE <14 mm could be an independent predictor of adverse hospital events (cardiac death, life-threatening arrhythmias and heart blocks, cardiogenic shock) in patients with primary LV inferior STEMI.[10]

However, data on the practical usefulness of standard 2D echocardiography and DMI parameters in patients with inferior STEMI in which the RV could be involved in the infarction leading to RV dysfunction are lacking. Thus, in patients with primary LV inferior STEMI, it may be relevant to evaluate function of both the LV and RV. The aim of the current study was to test the prognostic importance of a combination of LV MPI (as a marker of LV dysfunction) and TAPSE (as a marker of RV dysfunction) against LV MPI or TAPSE alone in patients with primary LV inferior STEMI.

PATIENTS AND METHODS

Study population

We prospectively considered 221 consecutive patients with newly diagnosed LV inferior STEMI who underwent standard 2D echocardiography and DMI at the Department of Urgent Cardiology of Erebouni Medical Center from 1998-2011. The reasons for non-inclusion were the following diseases and conditions that could possibly influence the study results, as detected by history or typical symptoms: permanent or persistent atrial fibrillation; congenital heart diseases; significant rheumatic aortal and/or mitral stenosis; permanent pacemaker; strokes; diseases with severe pulmonary hypertension; chronic kidney diseases; blood diseases; and other metabolic and oncological diseases.

Of the 221 study patients, 189 (85.5%) were male and 32 (14.5%) were female. The age range was 38-72 years old (mean: 58.2±4.5 years). A careful history of each of the 221 enrolled patients was taken, and a complete physical and standard instrumental and lab examinations were performed in all subjects.

Of the study population, 106 patients (48.0%) had RV infarction diagnosed on right precordial ECG leads (V_{4R}-V_{6R}).

With regard to the diagnosis of LV inferior STEMI and the treatment strategy, patients were treated according to the institutional STEMI protocol driven by the current guidelines.[11] In addition, 34 subjects underwent primary percutaneous coronary intervention (PCI), and 15 received thrombolytic treatment.

The patients were categorized into two groups according to cut-off values of the LV MPI and TAPSE

parameters, defined as 0.55 and 1.4 cm, respectively. Group 1 was defined as patients with LV MPI ≥0.55 and TAPSE ≤14 mm (n=78), while Group 2 included age-, sex- and additional diseases- and conditions-matched subjects (n=143) with LV MPI <0.55 and/or TAPSE >14 mm. There were no statistically significant differences between the groups regarding age, arterial hypertension (AH), diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD), Killip III-IV classes, or the main groups of prescribed medicines (angiotensin converting enzyme [ACE]-inhibitors, beta-blockers, spironolactone and other diuretics, dobutamine, statins, etc.). Table 1 summarizes the baseline clinical characteristics of the study population according to the two groups.

Patients were followed up 12 months for the endpoint of cardiac mortality and re-hospitalization. No patient data were lost to 12-month follow-up.

Echocardiography

All echocardiographic standard 2D and Doppler examinations were performed with a commercially available ultrasound machine, Siemens G65 (Germany), within 24 hours of LV inferior STEMI onset. The methodology of standard 2D echocardiographic and DMI examinations was based on the American Society of Echocardiography's guidelines.[12]

Left ventricular MPI was measured based on Doppler time intervals. It was calculated as the sum of the isovolumic contraction time (IVCT) and isovolumic relaxation time (IVRT) divided by the ejection time (ET). The sum of IVCT and IVRT was determined by measuring the time from the end of atrial filling (end of A-wave) to the onset of atrial filling (onset of E-wave) minus ET. ET was determined by measuring the LV-outflow velocity with the pulsed Doppler in the apical 5-chamber view below the aortic valve.[13]

To determine TAPSE, the apical 4-chamber view was used, and an M-mode cursor was placed through the lateral tricuspid annulus in real time in such a way that the annulus moved along the M-mode cursor, and the total displacement of the tricuspid annulus (in mm) from end-diastole to end-systole was measured.[14]

Statistical analysis

Statistical analyses were performed with a commercially available software program, the Statistical Package for the Social Sciences 17.0 (SPSS, Inc., Chicago, IL, USA).

Descriptive data are presented as mean and standard deviation (SD) or number (percentage). Comparisons between groups for categorical variables were performed using the χ^2 (chi-square) test.

Table 1. Baseline characteristics of the study groups

	All patients (n=221)		Group 1 LV MPI ≥0.55 and TAPSE ≤14 mm (n=78)		Group 2 LV MPI <0.55 and/or TAPSE >14 mm (n=143)		χ^2	*p*
	n	%	n	%	n	%		
Age (Mean±SD)	58.2±4.5		57.8±4.7		58.7±4.8		–	0.93 (NS)
Males	189	85.5	69	88.4	120	83.9	0.84	0.36 (NS)
Diabetes mellitus	47	21.3	21	26.9	26	18.2	2.30	0.13 (NS)
Arterial hypertension	93	42.1	32	41.0	61	42.7	0.06	0.81 (NS)
Chronic lung disease	86	38.9	33	42.3	53	37.1	0.58	0.44 (NS)
PCI	34	15.4	14	17.9	20	14.0	0.61	0.43 (NS)
Right ventricular involvement	106	48.0	38	48.7	68	47.5	0.03	0.87 (NS)
Killip III-IV class	33	14.9	16	20.5	17	11.9	2.96	0.09 (NS)
LV ejection fraction, mean		45.3		45.1		45.4	1.55	0.12 (NS)
Thrombolysis	15	6.8	6	7.7	9	6.3	0.16	0.69 (NS)

χ^2: Chi-square; LV MPI: Left ventricular myocardial performance index; NS: Not significant; SD: Standard deviation; TAPSE: Tricuspid annular plane systolic excursion; PCI: Percutaneous coronary intervention.

Logistic regression was used to determine whether a combination of LV MPI and TAPSE might be a better discriminator than each of those parameters alone in stratifying patients at high risk for hospital cardiac mortality, one-year cardiac mortality and one-year re-hospitalization. Covariate information (age, gender and clinical data regarding AH, DM, and COPD) was collected at the time of the echocardiographic examination in all enrolled patients. Adjusted Odds Ratios (OR_{adj}) were calculated to evaluate the individual prognostic importance of the research parameters. All statistical tests were two-sided, and *p*-values less than 0.05 were considered statistically significant. In the multivariate models, a variable was considered a significant predictor of endpoints if the *p*-value was less than 0.05. Observations with missing values for any of the covariates were excluded from the analyses.

Ethics approval

This study was approved by the local Ethics Committee of Yerevan State Medical University. Subjects were informed completely about the study and provided informed consent to voluntarily participate in the study.

RESULTS

A total of 221 patients with LV inferior STEMI met the inclusion criteria and were prospectively studied. Of these, 67 patients (30.3%) had died at 12 months: 23 (10.4%) during hospitalization and 44 (23.4% of all discharged patients) after discharge. Within the same 12-month period, 57 (28.8% of all discharged patients) were re-hospitalized for adverse cardiac events.

We made three-type analyses separately for (a) LV MPI ≥0.55 *vs.* LV MPI <0.55, (b) TAPSE ≤14 mm *vs.* TAPSE >14 mm, and (c) Combined LV MPI ≥0.55 and TAPSE ≤14 mm *vs.* Combined LV MPI <0.55 and/or TAPSE >14 mm.

As with the first comparison, the group of patients with LV MPI ≥0.55 (n=118) significantly differed from that with LV MPI <0.55 (n=103) with respect to one-year mortality (30.8% *vs.* 12.8%, p<0.01) and one-year re-hospitalization (39.4% *vs.* 17.0%, p<0.001) rates; no difference was found between the groups with respect to hospital mortality rate (11.9% *vs.* 8.7%, p>0.05).

Contrary to the above, the group of patients with TAPSE ≤14 mm (n=115) significantly differed from the group with TAPSE >14 mm (n=106) with respect to only hospital mortality rate (14.8% *vs.* 5.7%, p<0.05), and no differences were found with respect to one-year mortality (26.5% *vs.* 18.0%, p>0.05) or one-year re-hospitalization rates (24.5% *vs.* 20.0%, p>0.05).

Differences in frequencies of clinical outcomes between Group 1 with combined LV MPI ≥0.55 and TAPSE ≤14 mm (n=78) and Group 2 with combined LV MPI <0.55 and/or TAPSE >14 mm (n=143) are summarized in Table 2. According to chi-square statistical tests, all three parameters - hospital mortality rate (17.9% *vs.* 6.3%, p<0.01), one-year mortality rate (39.1% *vs.* 14.2%, p<0.001) and one-year re-hospitalization rate (50.0% *vs.* 18.7%, p<0.001) were significantly higher in Group 1 than in Group 2. We found no between-group difference in left ventricular ejection fraction (LVEF) (Table 1).

Table 2. Prevalence of research outcomes between the study groups

Endpoints	Group 1 LV MPI ≥0.55 and TAPSE ≤14 mm (n_0=78, n_1=64)*			Group 2 LV MPI <0.55 and/or TAPSE >14 mm (n_0=143, n_1=134)*			χ^2	*p*
	n	%	SE	n	%	SE		
Hospital mortality	14	17.9	4.3	9	6.3	2.0	7.35	0.0067
One-year mortality	25	39.1	6.1	19	14.2	3.0	15.52	0.0001
One-year re-hospitalization	32	50.0	6.2	25	18.7	3.4	20.76	0.0000

χ^2: Chi-square; LV MPI: Left ventricular myocardial performance index; NS: Not significant SE: Standard error; TAPSE: Tricuspid annular plane systolic excursion. Notes: *n_0 represents the initial sizes of Group 1 and Group 2, while n_1 indicates changes as of the one-year follow-up.

Further, OR_{adj} analysis between groups was done, which indicated that patients in Group 1 with LV MPI ≥0.55 and TAPSE ≤14 mm faced greater risk of hospital cardiac mortality (OR_{adj}=3.26, p<0.01), one-year cardiac mortality (OR_{adj}=3.88, p<0.001) and one-year re-hospitalization due to cardiac events (OR_{adj}=4.36, p<0.001) than those in Group 2 with LV MPI <0.55 and/or TAPSE >14 mm (Table 3).

A comparison of predictive patterns of only LV MPI ≥0.55, only TAPSE ≤14 mm and the combined LV MPI ≥0.55 and TAPSE ≤14 mm is summarized in Table 4, which demonstrates that the latter is seen as a much more powerful prognostic parameter for early and late cardiac events than LV MPI ≥0.55 and/or TAPSE ≤14 mm alone. Particularly, LV MPI ≥0.55 is seen to be an appropriate predictor of late cardiac events – one-year mortality (OR_{adj}=3.04, p<0.01) and one-year re-hospitalization (OR_{adj}=3.17, p<0.01), while TAPSE ≤14 mm is suitable for predicting hospital mortality only (OR_{adj}=2.89, p<0.05).

The suggested combination of LV MPI ≥0.55 and TAPSE ≤14 mm combines the predictive usefulness of TAPSE ≤14 mm for early (hospital) cardiac mortality and of LV MPI ≥0.55 for late (one-year) cardiac death and re-hospitalization. Moreover, combined LV MPI ≥0.55 and TAPSE ≤14 mm is shown to stratify patients with higher risks of the above clinical outcomes with greater significance - OR=2.85, p<0.01 for hospital mortality, OR=2.75, p<0.001 for one-year cardiac mortality, and finally, OR=2.38, p<0.001 for one-year re-hospitalization due to cardiac events.

Correlation analysis further revealed that both LV MPI and TAPSE separately, and LV MPI ≥0.55 and TAPSE ≤14 mm as a combined parameter, had no significant relations with co-factors. Particularly, LV MPI ≥0.55 and TAPSE ≤14 mm together demonstrated poor correlation with age (r=-0.032), gender (r=0.030), DM (r=0.098), AH (r=0.006), COPD

Table 3. Results of risk analysis between the study groups

	LV MPI ≥0.55 and TAPSE >14 mm (%) (n_0=78, n_1=64)	LV MPI <0.55 and/or TAPSE >14 mm (%) (n_0=143, n_1=134)	OR_{adj} (CI)
Hospital mortality	17.9	6.3	3.26* 99% (1.01-10.47)
One-year mortality	39.1	14.2	3.88** 99.9% (1.20-12.53)
One-year re-hospitalization	50.0	18.7	4.36** 99.9% (1.45-13.09)

CI: Confidence interval; LV MPI: Left ventricular myocardial performance index; OR_{adj}: Adjusted odds ratio; TAPSE: Tricuspid annular plane systolic excursion. Notes: * -p<0.01, **p<0.001.

Table 4. Comparison of prognostic significances of three estimators - LV MPI ≥0.55, TAPSE ≤14 mm and combined LV MPI ≥0.55 and TAPSE ≤14 mm

	OR_{adj} (p) LV MPI ≥0.55	OR_{adj} (p) TAPSE ≤14 mm	OR_{adj} (p) LV MPI ≥0.55 and TAPSE ≤14 mm
Hospital mortality	NS	2.89 (p<0.05)	3.26 (p<0.01)
One-year mortality	3.04 (p<0.01)	NS	3.88 (p<0.001)
One-year re-hospitalization	3.17 (p<0.01)	NS	4.36 (p<0.001)

LV MPI: Left ventricular myocardial performance index; NS: Not significant; OR_{adj}: Adjusted odds ratio; p - significance (p) value; TAPSE: Tricuspid annular plane systolic excursion.

(r=0.064), and RV infarction (r=0.039) ($p<0.05$ for all cases).

DISCUSSION

In this study, we showed that both LV and RV function provide strong prognostic information in primary LV inferior STEMI patients. The combined LV MPI ≥0.55 and TAPSE ≤14 mm parameter could be used as an independent predictor of hospital and one-year cardiac mortality as well as one-year re-hospitalization in primary LV inferior STEMI patients. We suppose that the relatively high mortality and re-hospitalization rates for the study population could be explained by the relatively lower rate of revascularization in the same population.

To our knowledge, this is the first investigation to test the usefulness of combined assessment of LV and RV function, measured by LV MPI and TAPSE, for the early diagnosis of LV and RV myocardial dysfunction and for estimating early and late prognosis in patients with primary LV inferior STEMI. The main finding of the current investigation is that the suggested combination of LV MPI and TAPSE was shown to be useful in patients with primary LV inferior STEMI for the early detection of dysfunction in both ventricles, which increases the risk of adverse cardiac events in the acute phase and one year after myocardial infarction.

The LV MPI was invented as a Doppler index of combined systolic and diastolic myocardial performance in patients with primary myocardial systolic dysfunction.[15] Currently, the LV MPI is widely known, and many authors have underlined its usefulness for practical implementation, especially for risk stratification purposes. Ascione et al.[16] revealed that LV MPI ≥0.47 is useful to predict which patients with first AMI are at high risk for hospital cardiac events (death, heart failure, arrhythmias, or post-AMI angina). Poulsen et al.[17] showed that LV MPI >0.45 in AMI patients was the strongest independent predictor of the development of congestive heart failure. In addition, Moller et al.[18] demonstrated that one-year survival in first AMI patients with LV MPI <0.63 is 89%, while the same parameter decreases to 37% in patients with LV MPI ≥0.63.

In contrast to LV dysfunction, the clinical importance of RV function has been underestimated. Although RV myocardial dysfunction was reported to recover to some extent after AMI, the value of RV function for the prediction of adverse cardiac events was well recognized recently in patients with inferior AMI and LV dysfunction.[19,20] Mehta et al.[21] showed in a meta-analysis that patients with RV involvement in inferior AMI were at increased risk of adverse events and demonstrated that RV involvement is not due to more extensive infarction of the LV. In post-AMI patients with LV dysfunction, Zornoff et al.[22] confirmed that RV function is weakly correlated with LV function, and they demonstrated that RV function quantified with RV fractional area change (FAC) was independently associated with an increased risk of mortality and heart failure.

With regard to TAPSE, it represents RV longitudinal function, and it is inferred that the greater the descent of the base in systole, the better the RV systolic function. In a study of 750 patients with a variety of cardiac conditions compared with 150 age-matched normal controls, Tamborini et al.[23] demonstrated that a TAPSE cut-off value <17 mm yielded high specificity (though low sensitivity) to distinguish abnormal from normal subjects. According to 46 studies with 2320 subjects, the mean reference value of TAPSE was determined to be 23 mm, with a lower reference value of 16 mm and upper reference value of 30 mm.[24]

As with LVEF, it was previously demonstrated that it is a prognostic marker for post-infarction complications, particularly for heart failure, mainly anterior AMI.[25] Our study results could indicate that for LV inferior STEMI, the prognostic importance of LVEF is diminished.

In contrast to previous studies, the current study evaluated the importance of RV function in patients with primary LV inferior STEMI. In addition to LV MPI, we assessed TAPSE and recommended combined LV MPI and TAPSE, which seems to have better predictive power since they measure different aspects of functions of both ventricles. While LV MPI measures global systolic and diastolic function of the LV, TAPSE is another frequently used measurement to assess RV function and reflects the longitudinal systolic excursion of the lateral tricuspid valve annulus, which may not fully reflect RV contractility.

We explored the relevant literature and found some evidence concerning the prognostic importance of LV

MPI and minimal data on TAPSE for patients with AMI, yet we found no data that would examine the predictive patterns of combining LV MPI and TAPSE.

Different from the above and other authors, we showed for the first time that the combined parameter of LV MPI ≥0.55 and TAPSE ≤14 mm could become a useful predictor of adverse events after primary LV inferior STEMI. Such a parameter has been demonstrated to be of incremental value in addition to LV MPI and/or TAPSE alone and superior to traditional measures of ventricular function for the prediction of adverse events after primary LV inferior STEMI.

Conclusion and clinical implications

This study highlights the necessity to focus more attention on the early routine assessment of RV along with LV myocardial function in the follow-up of primary LV inferior STEMI patients. Combination of LV MPI and TAPSE measured immediately after primary LV inferior STEMI appeared to be superior to the same parameters alone for the early risk stratification of patients for early and late cardiac events, and it could facilitate the identification of patients at risk for adverse cardiac events both during the hospital treatment regimen and one year after AMI. Quantitative assessment of LV and RV functions with LV MPI and TAPSE may improve the risk stratification of patients after first-time LV inferior STEMI.

Study limitations

The main limitation of the present study relates to the relatively small sample size of the patient population. The present study also lacked measurements of other echocardiographic parameters of LV and RV function, which may also be useful predictors of adverse outcomes in LV inferior STEMI patients. Therefore, with the above-mentioned limitations, long-term follow-up and large-scale prospective studies are needed to further confirm the predictive value of the suggested combined parameter.

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Key words: Acute myocardial infarction; echocardiography, Doppler; heart diseases/diagnosis; myocardial infarction/physiopathology; ventricular function, left.

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