

## Echocardiography

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### OP-001

Abstract Withdrawn

### OP-002

#### Prognostic Value of 2D Speckle Tracking Echocardiography in Patients with ST Segment Elevation Myocardial Infarction

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**Aim:** We aimed to investigate the prognostic value and reveal the role of a novel method speckle tracking echocardiography for predicting adverse cardiovascular events in STEMI patients undergoing successful primary percutaneous intervention (PCI).

**Methods:** We included 117 patients who admitted to Kocaeli University Cardiology Clinic with STEMI and underwent successful PCI between June 2011 and January 2012. After PCI, in the first three days (baseline) and at the first month after discharge (control), echocardiographic evaluations of patients were carried out. The relationship between cardiac adverse events that occurred during the six-month follow-up and echocardiographic parameters were evaluated. Patients were divided into two groups according to development of adverse event (a composite of revascularization, reinfarction and hospitalization for heart failure) and comparisons between groups were made.

**Results:** When we compare the baseline strain values of patients included in the study, the baseline average global longitudinal strain (GLS) of event group (n=20) was  $-12.10 \pm 2.59$ ; the baseline average GLS of event free group (n=97) was  $-14.46 \pm 3.65$ . In the group with event, we determined statistically significant lower baseline GLS values. In terms of baseline circumferential strain (CS) and radial strain (RS) values, there was no statistically significant difference between the two groups. In the roc analysis, when we use the threshold values below  $-12.9$  for the baseline GLS, we detected that baseline GLS predicted the development of adverse events with %75 sensitivity and %70 specificity. While there was no change in control GLS values from the baseline in the event group at first month echocardiography, in the event free group, statistically significant higher and improved strain values were observed. According to these results, increased strain values at the first month were associated with better prognosis. In terms of CS and RS values, there was no statistically significant difference between baseline and control in both groups.

**Conclusion:** Our study revealed that strain analysis with speckle tracking echocardiography is a new echocardiographic method which can be used to determine the prognosis of patients with STEMI.

### OP-003

#### Global Left Ventricle Myocardial Deformation Observed by Four-Dimensional Echocardiographic Evaluation was Impaired in Patients with Vitamin B12 Deficiency and Normal Conventional Echocardiographic Findings

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**Aim:** Conflicting effects of vitamin B12 deficiency have been shown on the cardiovascular system. We evaluated left ventricular (LV) myocardial functions with a new imaging method, four-dimensional (4D) real-time full-volume strain echocardiography (SE), and myocardial performance index (MPI or Tei index) obtained from tissue Doppler echocardiography (TDE) in patients with vitamin B12 deficiency and a normal conventional echocardiographic study.

**Methods:** Thirty patients with vitamin B12 deficiency (B12 levels <200 pg/ml; mean age:  $29.57 \pm 8.56$ , 18 female), and 32 healthy controls (B12 levels >200 pg/ml; mean age:  $29.38 \pm 6.40$ , 15 female) were included in the study. Two- and 4D echocardiography images were transferred to a workstation for further offline analysis. Conventional echocardiography, TDE and 4D SE were performed on all subjects.

MPI, left ventricle global longitudinal, circumferential and radial strain values were obtained.

**Results:** Demographic and laboratory data, standard echocardiographic parameters, TDE velocities and MPI were comparable between the groups except for hemoglobin levels and ejection time. All 4D strain values in the patient group were significantly lower than those in the control group. There was a positive correlation between B12 levels and 4D strain values except longitudinal strain values, though we could not reveal an independent association of vitamin B12 levels with the strain values. We only found the body mass index as an independent predictor of the impaired longitudinal strain (Table 1).

**Conclusion:** Longitudinal, circumferential and radial myocardial deformation was impaired in patients with B12 deficiency, and only radial and circumferential impairment was correlated with the levels of vitamin B12.

#### Correlation and regression analysis between left ventricle myocardial four dimensional strain values and clinical, laboratory and echocardiographic parameters

	Pearson correlation Coefficient	p value	β-Regression Coefficient	p value
Longitudinal strain				
Age	-0.289	0.024	-0.051	0.738
BMI	-0.507	<0,001	-0.519	0.003
E	0.338	0.008	0.276	0.109
E/A	0.299	0.019	-0.228	0.227
EDV	-0.312	0.015	0.433	0.490
ESV	-0.334	0.009	-0.520	0.532
ET	0.425	0.001	0.282	0.088
Circumferential strain				
B12	0.354	0.005	0.282	0.096
Hemoglobin	0.317	0.013	0.073	0.644
LVEF	0.337	0.008	-0.288	0.846
FS	0.352	0.005	0.356	0.816
SV	0.267	0.039	-0.006	0.990
IVCT	0.309	0.016	0.015	0.920
ET	0.306	0.016	0.079	0.664
Radial strain				
Age	-0.254	0.048	-0.096	0.532
BMI	-0.394	0.002	-0.203	0.205
B12	0.275	0.032	0.121	0.436

BMI, body mass index; LVEDV, left ventricle end-diastolic volume; LVESV, left ventricle end-systolic volume; ET, ejection time; LVEF, left ventricle ejection fraction; FS, fractional shortening; SV, stroke volume; IVCT, isovolumetric contraction time.

### OP-004

#### Subclinical Regional Myocardial Dysfunction Assessed by Two-Dimensional Speckle Tracking Echocardiography in Systemic Sclerosis Patients with Fragmented QRS Complexes

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**Background:** Systemic sclerosis (SSc) is a characterized by vascular dysfunction and excessive fibrosis. Cardiac manifestations are common in SSc while in the majority of SSc patients, these manifestations may remain subclinical. The aim of the study was to evaluate regional myocardial function of SSc patients by two-dimensional (2D) speckle tracking echocardiography (STE) and to explore a relation between regional myocardial dysfunction and fragmented QRS (fQRS) complexes present in surface electrocardiography (ECG).

**Methods:** The study included 53 consecutive patients with SSc (6 male, mean age:  $49.1 \pm 11.5$  years) and 26 healthy controls (4 male, mean age:  $42.8 \pm 11.7$  years). All SSc patients and controls underwent a transthoracic echocardiography to evaluate left ventricular (LV) function by 2D STE and a 12-derivation ECG to check for fQRS complexes.

**Results:** The fQRS was detected in 13 SSc patients (in inferior leads in 11 patients and in anterior leads in 2 patients). There were not any significant differences in conventional echocardiographic parameters between SSc patients and controls.

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However, SSc patients had significantly lower LV global longitudinal strain (GLS), LV global circumferential strain (GCS) and LV twist compared to controls. Additionally, SSc patients with fQRS had significantly lower LV GLS and LV GCS compared to SSc patients with normal QRS complexes although their conventional echocardiographic measures were similar (Table). The SSc patients with fQRS in inferior leads had significantly impaired longitudinal strain values in the inferior LV segments compared to SSc patients with normal QRS complexes (20.2±1.7% vs 22.8±3.3%, p=0.017).

**Conclusion:** SSc patients have regional subclinical myocardial dysfunction, which can be assessed successfully by 2D STE. Presence of fQRS in ECG is associated with lower strain measures in SSc patients indicating impaired LV function.

### Strain parameters of the SSc patients and controls

	SSc patients with fQRS (n= 13)	SSc patients with normal QRS (n= 40)	Controls (n= 26)	p
GLS	-19.6 ± 2.1	-21.6 ± 2.1	- 25.8 ± 2.7	<0.001 *,+, α
GRS	41.6 ± 18.3	37.9 ± 17.5	47.7 ± 7.0	0.053
GCS	-15.2 ± 5.1	-18.8 ± 4.9	-25.2 ± 3.3	<0.001 *,+, α
Twist	18.9 ± 5.5	16.4 ± 8.8	31.8 ± 9.4	<0.001 +, α

Data are presented as mean ± standard deviation Posthoc analysis:  
\* p<0.05 between SSc patients with fQRS and SSc patients with normal QRS + p<0.05 between SSc patients with fQRS and controls α p<0.05 between SSc patients with normal QRS and controls SSc: Systemic sclerosis; fQRS: Fragmented QRS; GLS: Global longitudinal strain; GRS: Global radial strain; GCS: Global circumferential strain

## Cardiac Imaging

### OP-005

#### Left Ventricular Rotational Deformation is Impaired in Pulmonary Hypertension: A Speckle Tracking Imaging- Based Study

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**Background:** Right ventricular (RV) pressure overload influences ventricular interdependence and subsequent left ventricular (LV) geometry. In the present study, we aimed to demonstrate the impact of increased RV pressure on LV systolic deformation and LV twist mechanics in the setting of pulmonary hypertension (PH).

**Methods:** We studied 25 patients with PH (age 44.23±4.67, 56% female) without any cardiac disease, and 20 age and sex-matched healthy controls. Among 25 patients 18 had chronic obstructive pulmonary disease, 3 had chronic thromboembolic PH and the rest had systemic lupus erythematosus. Patients with intrinsic LV diseases were excluded. Conventional echocardiography and speckle tracking- based strain imaging were performed to analyze LV twist mechanics.

**Results:** Left ventricular end diastolic diameter, LV end systolic diameter and LV ejection fraction were similar between the groups. Right ventricular (RV) diameter was significantly increased in patients with PH (3.2±0.22 cm to 2.29±0.12 cm; p=0.0001). Left ventricular eccentricity index (EI) was also increased in the patient group, when compared to healthy controls (1.35±0.23 to 0.93±0.11; p=0.0001). Left ventricular torsion was markedly impaired in PH group, compared with control subjects (5.88±2.33° to 14.9±2.26°; p=0.0001), demonstrating decreased LV twist mechanics. Additionally, we revealed that LV torsion was negatively correlated with pulmonary artery systolic pressure (r=-0.863, p=0.0001) and LV EI (r=-0.684, p=0.0001).

**Conclusions:** Chronic RV pressure overload influences LV geometry. LV torsion analysis based on speckle tracking echocardiography may provide insights into the impact of RV pressure overload on LV performance.

### OP-006

#### Evaluating Left Ventricular Functions in Primary Mitral Regurgitation by Two Dimensional Strain Echocardiography

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**Introduction and AIM:** Patients who develop progressive left ventricular dilatation and left ventricular dysfunction as a result of irreversible myocardial damage during the follow-up of chronic mitral regurgitation are known to have worse prognosis. In these patients, more sensitive parameters are imposed for recognizing left ventricular (LV) dysfunction in early stages, than the existing parameters such as ejection fraction (LVEF). LV strain and strain rate (S/SR) parameters are new methods that are being used for the evaluation of ventricle function. Our study aims to evaluate patients with mitral regurgitation using S/SR imaging, who's LV functions are evaluated as normal with conventional methods and the early detection of dysfunction.

**Material-Methods:** This study included 40 patients who were being followed at our clinic for chronic mitral regurgitation with normal LVEF and 31 patients as a control group with normal echocardiographic evaluation and without any symptoms. Detailed echocardiography was performed in all patients. Patients with mitral regurgitation were divided into two groups as moderate (n:19) and severe (n:21) according to the methods of qualitative and quantitative evaluation. For the evaluation of LV longitudinal deformation using speckle tracking method, anterior, inferior, septum, lateral wall S/SR values; for the evaluation of the radial deformation posterior wall S/SR values were calculated. The anterior wall S/SR values were decreased in severe MR group compared with moderate MR group and control group, but was not statistically significant (S:-17,8±3;-17,9±3,8;-18,2±3,9; SR:-1,04±0,2;-1,2±0,4; -1,2±0,3; p>0,05). Although the septum SR value was reduced in severe MR group, it was not statistically significant when compared with moderate MR group and control group (-1,2±0,2; -1,3±0,4; -1,3±0,2; p>0,05). Between three groups septum S values (-21,5±2,9; -20,7±4,7; -21,3±3,5; p>0,05), lateral wall S/SR values (S:-21,0±3,3; -21,0±4,8; -21,1±3,9; SR:-1,4±0,2; -1,6±0,5; -1,3±0,2; p>0,05), inferior wall S/SR values (S:-22,4±3,4; -21,7± 3,1; -22,3±3,3; SR:-1,4±0,3; -1,4±0,3; -1,5±0,7; p>0,05) were not significantly different. The global longitudinal strain values were not significantly different between severe MR, moderate MR and control groups (-20,9±1,4; -20,9±2,2; -20,5±2,2; p>0,05).

**Conclusion:** Despite the increase in the severity of mitral regurgitation in asymptomatic patients with primary mitral regurgitation, longitudinal and radial deformation parameters remained normal in patients which left ventricular function was evaluated as normal with conventional echocardiographic methods. As a result the deformation parameters were not superior to conventional methods in the early detection of left ventricular dysfunction due to the increase in severity of mitral regurgitation. In the long-term follow-up of these patients monitoring deformation parameters and comparing with monitoring conventional methods can be useful in evaluating left ventricle function.

### OP-007

#### Subclinical Left Ventricular Systolic Dysfunction in Patients with Severe Aortic Stenosis: A Speckle Tracking and Real Time Three Dimensional Echocardiographic Study

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**Background:** In patients with aortic stenosis (AS), changes in left ventricular (LV) geometry due to increased LV afterload, preserves LV ejection fraction (EF). However, subclinical myocardial dysfunction may develop despite normal LV EF. In the present study, we aimed to evaluate subclinical LV systolic dysfunction in patients with severe AS, without any cardiovascular disease and with normal LV EF, by using tissue Doppler imaging (TDI), a strain imaging method, "speckle tracking echocardiography" (STE) and its correlation with changes in LV geometry. We also performed a real time three dimensional echocardiography (3 DE) in order to demonstrate LV volumetric analysis.

**Methods:** We studied 25 patients (56% male, 73.9 years) with AS and 20 age and sex-matched controls, without any cardiac disease and with preserved LV EF. Conventional echocardiography, TDI, real time 3 DE and STE- based strain imaging were performed to analyse subclinical LV systolic function. Novel parameters currently used for the assessment of aortic stenosis severity were calculated according to related formulas (energy loss index (ELI), systemic arterial compliance (SAC), valvulo-arterial impedance).