Cardiac Imaging

### OP-006

**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 (44±14 years, female) without any previous 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 (15.2±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-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), valvuloarterial impedance).

Valvular Heart Diseases
Results: Conventional echocardiographic measurements (LV end diastolic diameter, LV end systolic diameter, LV EF) and LV volumes by 3 DE were similar between the groups. Interventricular septum and posterior wall thickness were increased, compared to controls. (1.27±0.07 cm to 1.1±0.19 cm, p = 0.02; 1.25±0.23 cm to 0.9±0.02 cm, p = 0.01, respectively). In TDI analysis, we observed marked reduction in LV peak systolic velocity (Sao) (0.06±0.08 m/s to 0.14±0.02 m/s, p = 0.0001). LV longitudinal peak systolic strain (9.66±1.29% to 17.60±2.18%, p = 0.0001) and strain rate (0.21±0.08/1/s to 1.66±0.56/1/s, p = 0.0001) were significantly impaired in patients, compared to controls, demonstrating subclinical ventricular systolic dysfunction. Significant positive correlation was obtained between energy loss index and LV strain/strain rate (r = -0.481, p = 0.015; r = -0.596, p = 0.002 respectively). Aortic valve area was also positively correlated with LV strain (r = 0.422, p = 0.036).

Conclusions: Patients with AS have evidence of subclinical LV systolic dysfunction, despite preserved EF. Changes in LV geometry are correlated to impairment in LV function. Strain imaging-based novel echocardiographic techniques may provide additional data for detecting early deterioration in systolic function in patients with AS.

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OP-008
The Long Term Incidence and Predictors of Radial Artery Occlusion Following a Transradial Coronary Procedure
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Objectives: Our aim was to establish the long term incidence of radial artery occlusion and investigate its predictors.

Background: Radial artery occlusion (RAO) is an infrequent complication of transradial coronary procedures (TRA). To our knowledge, there are no studies reporting the incidence and predictors of RAO in the late term following TRA.

Methods: This was a single center prospective study. A total of 409 consecutive patients undergoing their first TRA were recruited. Clinical and procedural data were all recorded. Doppler ultrasound examination was performed at the time of 6-15 months following the TRA.

Results: RAO was detected in 67 patients and 342 patients maintained radial artery patency (RAP). The overall RAO incidence was 16.4% at late term. Patients with RAO were younger than the patients with RAP (55.9±9.7 years versus 59.1±9.4 years, p = 0.014). The incidence of RAO in hypertensive patients was 9.8% lower (p = 0.001) than the observed incidence (23.0%) in non-hypertensive patients. RAO group has higher rate (28%, p = 0.027) of post-procedural access site pain. Regression analysis revealed that hypertension was negative while post-procedural access site pain was positive independent predictors for RAO. In addition the relative risk for RAO also increased significantly (p<0.001) when the ratio of sheath/artery diameter (S/A) was >1.

Conclusions: The present study reveals that the long term incidence of RAO is 16.4%. Hypertension, post-procedural access site pain and S/A ratio >1 are independent predictors of the long term incidence of RAO.

OP-009
Anxiety Score As a Risk Factor for Radial Artery Vasospasm During Radial Interventions: A Pilot Study
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Aim: Radial artery approach is an increasingly used technique. The most frequent complication of this approach is arm pain due to vasospasm. Studies about role of anxiety level on vasospasm are lacking, thus we sought to determine the role of anxiety level on radial artery spasm.

Method: A total of 82 patients who had an indication for coronary angiography were enrolled to study. Radial artery vasospasm was determined according to addressing five signs as follows: persistent forearm pain, pain response to catheter manipulation, pain response to sheath withdrawal, difficult catheter manipulation after being “trapped” by radial artery and considerable resistance on withdrawal of the sheath. Patients who had at least 2 of the 5 signs were diagnosed with clinical radial artery spasm. All patients were evaluated with Hamilton Anxiety Scale questionnaire in order to evaluate level of anxiety.

Results: The ratio of male to female was 45/56. Vasospasm was observed 19.1% of the patient population. The rate of vasospasm was 4.4% for men and 38.4% for women. Mean anxiety score of the whole study population was 14.0±7.9. The score was 17.6±7.3 for women and 11.1±7.2 for men. Anxiety score was significantly higher in women (p = 0.001). Vasospasm was strongly correlated with female sex (p < 0.001, R = 0.43) and anxiety score (p = 0.007, R = 0.29). Female sex was associated with higher anxiety scores (p < 0.001, R = 0.43). However, age was associated with neither anxiety score nor vasospasm (p > 0.05).

Conclusion: Higher anxiety scores and female sex are risk factors for radial artery vasospasm.

Table 1

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male (n = 45)</th>
<th>Female (n = 36)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety Score</td>
<td>11.1 ± 2.2</td>
<td>17.6 ± 7.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Vasospasm (%)</td>
<td>4.4</td>
<td>38.4</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>172.1 ± 7.4</td>
<td>162.5 ± 6.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>87.2 ± 13.6</td>
<td>79.8 ± 14.4</td>
<td>NS</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>29.4 ± 4.3</td>
<td>30.2 ± 5.3</td>
<td>NS</td>
</tr>
</tbody>
</table>

Comparison of male and female patients who underwent radial coronary angiography

OP-010
Predictors of Microvascular Obstruction Assessed by the Index of Microcirculatory Resistance Following Primary Percutaneous Coronary Intervention for Acute ST-Elevation Myocardial Infarction
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PURPOSE: We aimed to investigate the predictors of microvascular obstruction (MVO) among clinical, electrocardiographic, laboratory and angiographic parameters available on admission in patients with acute ST-elevation myocardial infarction (STEMI) treated with primary percutaneous coronary intervention (pPCI).

Methods: Forty-nine patients treated successfully by pPCI were enrolled. On post-pPCI day 4 to 5, index of microcirculatory resistance (IMR) was measured with the use of a guidewire tipped with pressure and temperature sensors. MVO was defined as IMR above the mean value of 31 U.

Results: The mean IMR was 31.2±14.5 U. MVO was present in 23 (46.9%) patients. At univariate analysis, age >65 (p = 0.012), pain to balloon time>180 min (p = 0.012), ST segment resolution (STR) at postprocedural 90th min <70% (p = 0.05), lesion length (p = 0.04), BNP level on admission (p = 0.035) and D-dimer level on admission were found to be associated with MVO. At multivariate analysis, pain to balloon time>180 min (Odds ratio (OR) 2.94, 95% Confidence Interval (CI) 1.5 – 5.0, p = 0.025), STR<70% (OR 5.5, 95% CI 1.64 – 20, p = 0.05), BNP level on admission (OR 1.029 per unit increase, 95% CI 1.002 – 1.057, p = 0.035), and D-dimer level on admission (OR 1.11 per unit increase, 95% CI 1.016 – 1.212, p = 0.035), were found to be independent predictors of MVO.

Conclusions: In addition to the well known predictors of MVO such as delayed time to reperfusion and incomplete STR, we showed that BNP and D-dimer levels on admission independently predict the presence of MVO in patients with STEMI treated with pPCI.

OP-011
Assessment of Silent Neuronal Injury Following Coronary Angiography and Intervention in Patients with Acute Coronary Syndrome
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Objectives: To date limited data is available regarding the occurrence and predictors of silent neuronal injury (SNI) after percutaneous coronary intervention (PCI). The aim of this study is to evaluate the incidence and predictors of SNI after coronary angiography and intervention by serial measurement of serum neuron specific enolase (NSE) in patients presented with acute coronary syndrome.

Methods: Ninety-eight consecutive patients presented with ACS who underwent coronary angiography and intervention were included in the study. NSE was studied before and 18 hour after the PCI. Clinical and echocardiographic characteristics were analyzed and independent predictors of SNI were evaluated.