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## Dynamic changes of left ventricular cardiac mechanics in takotsubo syndrome: a preliminary study

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**Background:** Takotsubo syndrome (TTS) is a transient left ventricular (LV) heart failure due to a reversible systolic dysfunction, usually recovering within days or weeks.

**Purpose:** To assess the dynamic changes of LV cardiac mechanics in a small cohort of TTS patients through the estimation of myocardial work, a newly developed non-invasive approach which allows correction of global longitudinal strain (GLS) for systolic blood pressure.

**Methods:** Twenty-four patients (mean age,  $63.8 \pm 8.4$  yy; all female) with TTS diagnosis were retrospectively enrolled. Data from transthoracic two-dimensional and speckle-tracking echocardiography on admission and at 3 months follow-up were collected. Global myocardial work index (GWI, mmHg%) was calculated as the area of the LV pressure (LVP)-strain loop, where LVP was estimated noninvasively using a standard waveform fitted to valvular events and scaled to systolic blood pressure. From GWI we also assessed: global constructive work (GCW, mmHg%: work performed during shortening in systole + negative work during lengthening in isovolumetric relaxation, IVR), global wasted work (GWW, mmHg%: negative work performed by a segment during lengthening in systole + work performed during shortening in IVR) and global work efficiency (GWE, %: constructive work divided by the sum of constructive and wasted work). Baseline demographic and clinical features, including in-hospital adverse events as acute heart failure, cardiogenic shock and cardiac death, were also assessed.

**Results:** On overall population, a reduced ejection fraction (EF) and GLS were detected at hospital admission, with a substantial improvement at discharge and at follow-up (from  $41.7 \pm 8.3\%$  to  $54.5 \pm 6.5\%$  to  $60.2 \pm 4.6\%$  for EF and from  $-11.7 \pm 4.5\%$  to  $-16.2 \pm 4.2\%$  to  $-21.3 \pm 2.8\%$  for GLS, respectively). Similarly, global MWI and MWE both showed a positive trend during the hospital course and at follow-up: MWI increased from  $1048.8 \pm 580.5$  to  $1522.4 \pm 695.4$  to  $2021.1 \pm 388.6$  mmHg% and MWE from  $78.7 \pm 10.2$  to  $91.1 \pm 4.6$  to  $94.5 \pm 3.8\%$ . Increasing in MWE has been obtained through an improvement of GCW (from  $1195.9 \pm 537.2$  to  $1651.3 \pm 700.3$  to  $2316.8 \pm 490.6$  mmHg%) and a contemporary decreasing in GWW (from  $237.9 \pm 137.2$  to  $106 \pm 37.2$  to  $131.8 \pm 150.8$  mmHg%).

In-hospital adverse events occurred in 8 (50%) patients. Of note, despite EF and GLS at admission showed no significant differences, patients experiencing in-hospital adverse events showed lower value of acute MWI ( $725.6 \pm 289.6$  vs  $1371.9 \pm 632.1$  mmHg%;  $p = 0.02$ ) and MWE ( $73.6 \pm 3.4$  vs  $83.8 \pm 12.4\%$ ;  $p = 0.04$ ) compared to patients without in-hospital complications.

**Conclusion:** Non-invasive assessment of myocardial work through echocardiographic strain-based technique could be useful to demonstrate the peculiar dynamic changes of cardiac mechanics and for a better risk stratification in TTS patients.

Abstract P322 Figure.

