

Myocardial work analysis is a potential novel tool to diagnose subclinical cardiac dysfunction in cirrhotic cardiomyopathy

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Background. Cirrhotic cardiomyopathy (CCM) is defined as systolic and/or diastolic cardiac dysfunction, associated with high preload and low afterload. Thus, assessment of cardiac dysfunction in these circumstances is still debatable. Left ventricular (LV) deformation is still load-dependent, and does not reflect directly myocardial energy consumption. Since myocardial work (MW) incorporates both deformation and afterload, it might be a better alternative for the assessment of LV function in CCM.

Methods. 80 subjects were assessed by 2D conventional and speckle tracking echocardiography (STE): 40 patients with liver cirrhosis (LC) (58 ± 8 years, 23 males), free of any cardiovascular disease or diabetes, and 40 age and gender matched normal, control subjects. Left ventricular ejection fraction (LVEF) and systolic/diastolic blood pressure (SBP/DBP) were measured. A new approach was used to evaluate myocardial work by 2DSTE: global constructive work (GCW), as the "positive" work of the heart; global wasted work (GWW), as the "negative" work of the heart; global work efficiency (GWE), as the $GCW/(GCW + GWW)$ in %; and global work index (GWI), as the GCW added to GWW. E/E' ratio, left atrial volume index (LAVi), and systolic pulmonary arterial pressure (sPAP) were also assessed.

Results. Patients with LC had significantly lower SBP/DBP than controls, with similar LVEF (Table). GCW and GWI were decreased in patients with LC, probably due to decrease in afterload, which shifts LV work to a lower level of energy. GWE and GWW were similar to controls. By segmental analysis (18 segments model), apical and mid antero-lateral segments were the first affected in terms of myocardial work, with higher WW, low WE, but without a compensatory increase in CW in other segments, suggesting a regional myocardial dysfunction. All patients with LC presented significantly elevated E/E' ratio, LAVi, and sPAP, compared to controls (Table).

Conclusion. Myocardial global constructive work and global work index decrease in LC patients, compared to normal individuals, probably due to augmented peripheral vasodilatation. Apical and mid antero-lateral segments are the first affected. Assessment of global and regional MW might be a potential new tool to assess CCM, and to understand the relationship between LV remodeling and increased filling pressure under different loading conditions.

Comparative myocardial work indices

group	SBP (mmHg)	DBP	LVEF (%)	E/E'	LAVI	sPAP	GWl	GWE (%)	GCW (mmHg)	GWW (mmHg %)
LC (40)	111 ± 14	69 ± 12	59 ± 7	8.5 ± 2.5	45.9 ± 14.5	26 ± 9	1927 ± 379	95 ± 2	2068 ± 386	90.1 ± 49
Controls (40)	126 ± 14	76 ± 8	61 ± 7	7.5 ± 2.2	31.8 ± 6.8	21 ± 8	2123 ± 353	95 ± 2	2302 ± 335	94.4 ± 49
P value	0.001	0.004	0.3	0.05	0.001	0.009	0.01	0.9	0.005	0.7

Abstract P1513 Figure. Myocardial Work Cirrhotic Cardiomyopathy

