Tissue Doppler, Speckle Tracking and Strain Imaging

The combined use of electrocardiography, echocardiography and cardiac magnetic resonance imaging in left atrium evaluation among beta-thalassemia patients

Patsourakos D.; Aggeli C.; Gatzoulis K.; Delicou S.; Dimitroglou Y.; Androulakis A.; Tsioufis C.; Tousoulis D.

Hippokration General Hospital, Athens, Greece

Funding Acknowledgements: Type of funding sources: None.

Introduction: Beta-thalassemia major (β-TM) patients are subjected to iron overload as a consequence of chronic blood transfusions. The redundant iron affects, among other organs, the heart resulting in myocardial dysfunction. Iron deposition does not only affect ventricular myocardium but atrial myocardium as well. According to current practice, the overall myocardial iron status is estimated by calculating T2* at the middle section of the ventricular septum using cardiac magnetic resonance imaging (CMR). Current CMR technology limits the direct estimation of atrial iron status.

Purpose: The current study evaluates left atrial function by novel echocardiographic techniques and correlates these findings with CMR data.

Methods: 37 β-TM patients (mean age 41.17 years (SD = 8.33), 51.4% male), were subjected to electrocardiography, echocardiography and CMR imaging and P wave axis, PR segment duration, left atrial volume index (LAVI), left atrial strain at reservoir phase (LASr) and T2* were measured.

Results: No correlation between T2* and LASr (r = 0.253, p = 0.131) or T2* and LAVI (r = 0.044, p = 0.796) were found. However, a correlation was found between the echocardiographic parameters LAVI and LASr (r = -0.676, p <0.001). P wave axis did not correlate with any other parameter, while PR segment duration was correlated with LASr (r = -0.399, p = 0.015). Regression analysis revealed correlation between LAVI and LASr (r2 = 0.457, p <0.001).

Conclusions: The current study suggests that despite the undisputed contribution of CMR in left ventricular iron load estimation, it may be less accurate in atrial iron status estimation. Considering the limitations of current CMR technology regarding the iron status of the thin atrial and right ventricular walls, our study highlights the role of speckle tracking in combination with CMR imaging for a more comprehensive evaluation of β-TM patients.

Correlation table

	P axis	PR segment	T2*	LAVI	LASr
P axis		0,151 (p = 0,373)	0,112 (p = 0.,508)	-0,140 (p = 0,410)	-0,117 (p = 0,489)
PR segment	0,151 (p = 0,373)		0,051 (p = 0,766)	0,278 (p = 0,096)	-0,399 (p = 0,015)
T2*	0,112 (p = 0.,508)	0,051 (p = 0,766)		0,044 (p = 0,796)	0,253 (p = 0,131)
LAVI	-0,140 (p = 0,410)	0,278 (p = 0,096)	0,044 (p = 0,796)		-0,676 (p <0,001)
LASr	-0,117 (p = 0,489)	-0,399 (p = 0,015)	0,253 (p = 0,131)	-0,676 (p <0,001)	

T2*: obtained by cardiac magnetic resonance imaging**LAVI:** left atrial volume index (ml/m2)**LASr:** left atrial strain at reservoir phase

Abstract Figure. Correlation between LASr and T2*