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Abstract

On the Selection of Region of Interest in Measurement of Cardiac Magnetic Resonance Imaging T2* Value in Thalassemia Major Patients

Somayeh Gholami Bardeji,[1,*] Mahdi Dodangeh, Zeinab Gholami,[2] Reza Jalli,[2] Mehrzad Lotfi,[3] Mehran Karimi,[2] Rezvan Ravanfarhaghighi, Sepideh Sefidbakht,[2] and Bijan Bijan[4]

[1]Postdoc
[2]Radiology Department, Shiraz University of Medical Sciences, Shiraz, Iran
[3]Medical Imaging Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
[4]University of California Davis Medical Center, USA

[*]*Corresponding author*: Somayeh Gholami Bardeji. E-mail: s.gholamii@gmail.com

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Abstract

Objectives: To investigate the correlation between T2* values of different regions of interest (ROIs) in myocardium with the means of semi quantitatively estimating the myocardiac iron content in the thalassemia major patients. In the same setting we tried to design a model to predict T2* value of interventricular septum (septum) based on T2* values of other convenient ROIs in myocardium.
Methods: 130 patients underwent ECG-gated cardiac magnetic resonance imaging (MRI), and T2* values were measured in different ROIs. Full-thickness ROIs are drawn manually in septum, entire left ventricle (LV) wall, the region of the best visual conspicuity (sharp), and LV free wall. The relation between T2* values of these four regions are investigated. Depends on the grade of siderosis, the patients are divided into four groups; Severe: $T2^* \leq 10$, Moderate: $10 < T2^* \leq 15$, Mild: $15 < T2^* \leq 20$, and Normal: $T2^* > 20$. The statistical analysis carried out using Matlab R2015b.
Results: In patients with the cardiac $T2^* \leq 20$, the statistical analysis confirms a significant correlation ($\alpha = 0.001$) between T2* values of septum and the ROIs named above. Moreover, the statistical results become more concordant with decreasing T2* values. In addition, for patients with a $T2^* > 20$, a weak correlation is noticed between T2* values of different ROIs. Three predictor models are provided to estimate T2* value of septum using T2* values of entire LV wall, sharp region, and LV free wall.
Conclusions: The T2* values of the LV free wall and the entire LV wall are reliable alternatives to estimate the T2* value of septum. The predictor model based on T2* value of entire LV wall provides the most reproducible estimation.

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