

ONSET OF CARDIAC IRON LOADING IN A LARGE AND HOMOGENOUS COHORT OF THALASSEMIA MAJOR PEDIATRIC PATIENTS

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Introduction. Magnetic Resonance Imaging (MRI) by the T2* technique allows highly reproducible and non invasive quantifications of myocardial iron burden and it is the gold standard for quantifying biventricular function parameters [1, 2]. It is important to determine the appropriate age to start MRI screening, because its high cost. Few data are available in the literature and they are contrasting [3]. So the aim of this study was to address this issue in our paediatric patients with thalassemia major (TM).

Materials and methods. We studied retrospectively 72 patients (47 males, 4.2-17.9 years old, mean age 13.03 ± 3.70 years), enrolled in the MIOT (Myocardial Iron Overload in Thalassemia) network [4]. Myocardial iron overload was measured by T2* multislice multiecho technique [5]. Biventricular function parameters were quantitatively evaluated by cine images. DE images were acquired to detect myocardial fibrosis [6]

Results. The global heart T2* value was 29.7 ± 11.2 ms (range 6.2 - 48.0 ms). No significant correlation was found between global heart T2* value and age (Figure 1). The global heart T2* value did not show significant differences according to the sex (male 30.2 ± 11.0 ms versus female 28.7 ± 11.8 ms, $P=0.568$). Sixteen patients (22%) showed an abnormal global heart T2* value (<20 ms) and none of them was under 8 years of age. Table 2 shows the correlation between global heart T2* value and various hematological and CMR parameters. Global heart T2* value was negatively correlated with mean serum ferritin levels (Figure 2). Odds Ratio for high serum ferritin levels (≥ 1500 ng/ml) was 8.4 (1.01-69.37, OR 95%CI) for abnormal global heart T2* values (< 20 ms). The global heart T2* value did not show a significant difference with respect to the chelation therapy ($P=0.322$). No significant correlations were found between the global heart T2* values and the bi-atrial areas or the LV and RV morphological and functional parameters. Eight patients showed a left ventricular (LV) ejection fraction (EF) $< 57\%$ and none of them was under 7 years of age. Two patients showed a right ventricular (RV) EF $< 52\%$ and none of them was under 14 years of age.

Table 1.

	Correlation Coefficient (r)	P value
Hb pre-transfusion (g/dl)	-0.189	0.137
Ferritin levels (ng/l)	-0.517	<0.0001
ALT (u/l)	-0.428	0.002
AST (u/l)	-0.403	0.001
Left Atrial Area (cm2)	0.203	0.172
Right Atrial Area (cm2)	0.077	0.607
LV EDVI (ml/m2)	0.025	0.857
LV ESVI (ml/m2)	0.044	0.750
LV SVI (ml/m2)	0.099	0.471
LV Mass index (g/m2)	0.076	0.581
LV EF (%)	0.183	0.181
RV EDVI (ml/m2)	0.013	0.924
RV ESVI (ml/m2)	0.149	0.278
RV SVI (ml/m2)	-0.120	0.383
RV EF (%)	-0.159	0.388

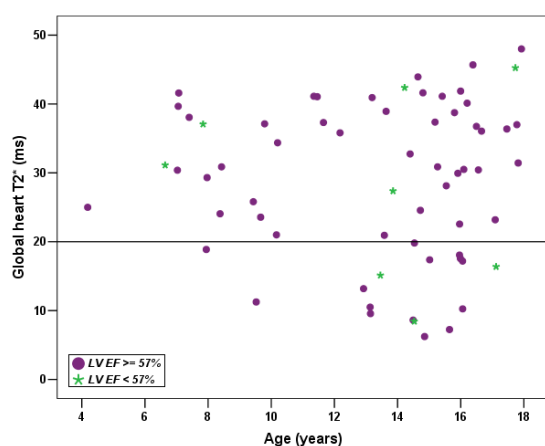


Figure 1.

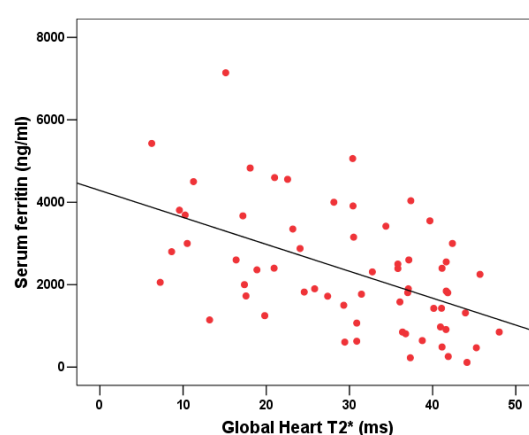


Figure 2

Conclusion. The MRI screening for both cardiac iron overload and function assessment can be started for TM patients at the age of 7 years. At this age not sedation is generally needed. If the availability of cardiac MRI is low, the serum ferritin levels could be used as a discriminating factor.

References: [1] Borgna-Pignatti C et al. Haematologica 2004;89:1187-93. [2] Cogliandro T et al. J Cardiovasc Med 2008;9(5):515-525. [3] Wood JC et al. Haematologica 2008; 93:917-920. [4] Meloni A et al. Int J Med Inform 2009;78(8):503-512. [5] Pepe A et al. JMIR 2006;23(5):662-668. [6] Pepe A et al. Heart 2009;95:1688-1693.