New Diagnostic Methods for Left Ventricular Function of the Patients with Beta-Thalassemia Major

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Introduction:
The aim of this study is to determine the early regional and global myocardial functional changes and whether the myocardial changes that cannot be detected by conventional echocardiography could be detected by T2* magnetic resonance imaging (MRI), tissue Doppler imaging (TDI) or speckle-tracking echocardiography (STE) in beta-thalassemia major (BTM) cases without symptoms.

Methods:
The myocardial functions were evaluated by conventional echocardiography, TDI and STE in 30 children with BTM and 30 healthy children. Cardiac T2* MRI has been used to measure the amount of cardiac iron deposition.

Results:
The mean age of the patients was 13.3 months at the time of the diagnosis. The mean duration of taking erythrocyte transfusion was 13.5 years.

When left ventricular basal lateral wall and basal septum TDI values were compared between the patients with BTM and the control group; it was observed that only isovolumic contraction time (ICT) values were statistically significantly longer in the patients with BTM.

Longitudinal and circumferential strain values were statistically significantly lower in the patients with BTM than the control group globally. In addition, when evaluated as segmental; longitudinal strain of basal interventricular septum, and circumferential strain values of anteroseptal, and anterior segments, were significantly lower in the patients with BTM than the control group.

In the patients with BTM, the group who have pathological T2* MRI values (<20ms, n=10), longitudinal and circumferential strain values globally were significantly lower than the group who have not. In addition, circumferential strain values in anteroseptal, anterolateral, inferior, and inferoseptal segments were significantly lower in the patients with T2* values <20ms than those with T2* values ≥20ms.

Conclusions:
Cardiovascular T2* MRI is the most sensitive test in detecting myocardial iron load. However, it is expensive and is not widely available in many centers. Echocardiography is available in many centers and easy to perform. Our results indicate that STE and TDI can be used for screening of patients for myocardial dysfunction. Findings of this study and future longitudinal studies might have an important impact on monitoring the effects of the chelation therapy.