

## Echocardiographic Assessment of Cardiac Involvement in Patients with Thalassemia Major: Evidence of Abnormal Relaxation Pattern of the Left Ventricle in Children and Young Patients

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### Abstract

**Background-** Cardiac involvement which leads to congestive heart failure (CHF) is a major cause of death in patients with thalassemia major due to hemosiderosis and chronic anemia. Although the left ventricular (LV) systolic function in patients with thalassemia major has been considerably studied, LV diastolic function has not been assessed adequately. In this current study we used Doppler echocardiography to assess LV function. The aim of our study is to investigate the consequences of chronic anemia and transfusional iron overload on the LV function, especially the diastolic filling pattern in patients with thalassemia major. We sought to test the hypothesis of measurement of myocardial performance index (MPI) and isovolumetric relaxation time (IVRT) in an early stage of the disease, when iron overload has not yet caused irreversible changes.

**Methods-** 65 patients with thalassemia major in New York Heart Association (NYHA) class I, II who have been treated with desferrioxamine with mean age of  $11 \pm 3$  years were randomly selected and assessed by Doppler echocardiography and the data were compared prospectively with those obtained in 48 age and sex-matched normal subjects.

**Results-** MPI was increased in thalassemic patients compared with normal control subjects ( $0.42 \pm 0.06$  vs.  $0.34 \pm 0.04$ , P value=0.015). IVRT was increased in patients vs. compared to controls ( $60 \pm 11$  msec vs.  $42 \pm 6$  msec, P value=0.020), indicating impaired relaxation in the early stage of LV diastolic dysfunction due to hemosiderosis. The peak velocity in late diastole (A) was increased in patients compared to controls ( $54 \pm 6$  cm/sec vs.  $38 \pm 4$  cm/sec, P value=0.034), while the ratio between the early and late peaks of flow velocity (E/A ratio) was reduced ( $1.3 \pm 0.2$  vs.  $1.8 \pm 0.3$ , P value=0.028). E deceleration time was increased in patients compared to controls ( $180 \pm 28$  msec vs.  $140 \pm 26$  msec, P value=0.044), whereas no difference was found in left ventricular ejection fraction (LVEF) and left ventricular fractional shortening (LVFS) in patients compared to controls (LVEF  $60 \pm 8$ , vs.  $64 \pm 6$ , P value 0.068) and (LVFS  $34 \pm 6$  vs.  $36 \pm 4$ , P value=0.072). Left ventricular end-diastolic volume (LVEDV) was increased in patients compared to controls ( $52 \pm 12$  cc/m<sup>2</sup> vs.  $38 \pm 8$  cc/m<sup>2</sup>, P value=0.012), indicating effects of chronic anemia on LV function.

**Conclusion-** The findings of this study also suggest that chelating therapy does not completely protect patients with thalassemia major from myocardial damage due to iron – related cardiac toxicity and there was no correlation between ferritin level and LV dysfunction. Evaluation of diastolic function and measurement of MPI and IVRT are simple and useful in early detection of LV dysfunction, especially in asymptomatic young patients in an early reversible stage of the disease when iron overload has not yet caused systolic dysfunction (*Iranian Heart Journal 2006; 7 (1): 31-36*).

**Key words:** myocardial performance index ■ isovolumic relaxation time ■ left ventricular end diastolic volume

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