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Assessment of right ventricular function with tissue Doppler imaging in children with asthma

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Objectives: In the patients with asthma, pulmonary hypertension develops due to recurrent hypoxia and chronic inflammation, leading to right heart enlargement with ventricular hypertrophy. Patients with severe asthma can experience cor pulmonale later in life, but little is known about right ventricular function early in the disease. This study aimed to investigate the right ventricular function in asymptomatic children with asthma as detected by conventional echocardiography and tissue Doppler imaging (TDI).
Methods: Fifty-one paediatric patients (mean age: 10.4 ± 2.2 years) with asthma and 46 age- and sex-matched healthy children (mean age: 10.9 ± 2.4 years) were studied. All subjects were examined on conventional echocardiography and TDI, and 51 patients with asthma had pulmonary function tests on spirometry.
Results: The right ventricle wall was statistically ($p = 0.01$) thicker among the asthmatic patients (4.7 ± 1.5 mm) than among the healthy children (3.6 ± 0.4 mm). But the conventional pulsed Doppler indices of right ventricle did not differ significantly between the asthmatic patients and the control subjects ($p > 0.05$). The results of TDI examining the right ventricular diastolic function showed that mean early diastolic flow velocity (E´) and late diastolic flow velocity (A´) (13.2 ± 2.3 cm/s and 5.1 ± 1.4 cm/s, respectively), E´/A´ ratio (2.7 ± 0.7) and isovolumetric relaxation time (67.7 ± 10.2 msn) of the lateral tricuspid annulus among the asthmatic patients significantly differed ($p = 0.01$) from those among the healthy children (16.4 ± 1.8 cm/s, 8.2 ± 2.0 cm/s, 2.1 ± 0.5, and 46.2 ± 8.7 ms, respectively). From the pulmonary function tests, only peak expiratory flow rate was positively correlated with the E´/A´ ratio of the tricuspid annulus ($r = 0.38$, $p = 0.01$).
Conclusions: This study showed that although the findings of clinic and conventional echocardiography of were apparently normal in children with asthma, TDI demonstrated subclinical dysfunction of right ventricle, which is positively correlated with the peak expiratory flow. These findings signify the diagnostic value of TDI in the early detection and monitoring of such deleterious effects among asthmatic patients.