Evaluation of pediatric patients after surgical repair of tetralogy of Fallot using tissue Doppler and tissue synchronization imaging

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ABSTRACT

Background: Tetralogy of Fallot (TOF) is the most common cyanotic heart congenital disease. Although surgical repair is satisfactory, the operated heart is not anatomically normal. These patients develop many cardiac functional and electrical abnormalities. We aimed to detect left ventricular dyssynchrony and to evaluate systolic and diastolic function after successful Fallot repair in the pediatric age group.

Methods: this cross sectional study included 25 post-operative pediatric patients with surgically repaired TOF. Fifteen sex and age matched healthy children were included as control. All patients were subjected to clinical assessment, chest X-ray, electrocardiography (ECG) and conventional echocardiography in addition to tissue Doppler echocardiography and automated tissue synchronization imaging using (GE vivid 7) machine.

Results: the mean age of the studied cases was 9.04±3.41y. In our study there were systolic and diastolic RV dysfunction in patients in comparison to controls as manifested by statistically significant lower S' E' A' tissue velocities, longer relaxation time and increased MPI of RV in comparison with controls. There was a positive statistical significant correlation between age of patient at surgery and E' of RV (P = 0.02) There was a positive statistical significant correlation between postoperative duration and IRT of LV (p = 0.05). Using the automated TSI method, 8 patients (32%) had mild to moderate delay in all segment standard deviation but there was no statistically significant difference between cases and controls regarding the main six indices evaluated by the TSI algorithm including (septolateral delay, Basal septal delay, basal septal maximum difference, all segment maximum delay, all segment standard deviation, septal posterior delay).

Conclusion: There is evidence of early diastolic dysfunction and restrictive pattern in both ventricles. Automated TSI provides a simple, rapid, and comprehensive assessment of intra-ventricular dyssynchrony. The automated processing algorithm reduces the impact of operator skill and improves reproducibility. LV dyssynchrony is not detected in the pediatric age group after Fallot repair.