

Evaluation of the myocardial deformation and function by speckle tracking echocardiography and tissue Doppler imaging in infants and preschool children with iron deficiency anemia

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Objectives

The aim of the study was to assess the myocardial deformation and function by speckle tracking echocardiography (STE) and tissue Doppler imaging (TDI) in infants and preschool children with iron deficiency anemia.

Methods

Forty patients (mean age 2,5 years, 19 female) diagnosed iron deficiency anemia and twenty healthy children (mean age 3,6 years, 10 female) were studied prospectively. The conventional echocardiography, STE and TDI were performed in patients and control group. The left ventricular longitudinal global strain (LVLGS) and strain rate (LVLGSR), left ventricular circumferential global strain (LVCGS) and strain rate (LVCGSR), and right ventricular longitudinal global strain (RVLGS) and strain rate (RVLGSR) were examined by STE. The myocardial velocities (S_m , E_m and A_m) and time intervals [isovolumic contraction time (ICT), isovolumic relaxation time (IRT) and ejection time (ET)] at interventricular septum (IVS), left ventricular posterior wall, right ventricular lateral wall were examined by TDI.

Results

S_m (6,0 vs. 6,8 cm/s) and E_m (11.0 vs 13,2 cm/s) at IVS, S_m (5,6 vs. 7,8 cm/s) and E_m (13,8 vs 15,8 cm/s) at LV, E_m (14,8 vs 16,8 cm/s) at RV, ET (200,2 vs. 235,1 ms) at IVS, ET (198,2 vs. 240,9 ms) at LV, and ET (195,9 vs. 233,8 ms) at RV were statistically significantly lower in patients than controls ($p < 0.05$). MPI (0,59 vs. 0,45) at IVS, IRT (63,9 vs 56,1), and MPI (0,63 vs. 0,47) at LV, ICT (60,9 vs. 53,4), and MPI (0,6 vs 0,46) at RV were statistically significantly increased in patients than controls. LVLGS (-22,7 vs. -25,4%), LVLGSR (0.43 vs. 0.94 s^{-1}), RVLGSR (0.75 vs. 0.99 s^{-1}), LVCGSR (0.76 vs. 1 s^{-1}) were significantly decreased in patients than controls ($p < 0.05$ for LVLGS and LVCGSR, $p = 0.001$ for LVLGSR and RVLGSR).

Conclusions

Iron deficiency anemia results in both systolic and diastolic myocardial dysfunction even in children with normal conventional echocardiographic findings. The STE and TDI are useful methods to evaluate myocardial function in these patients.

Table 1: The tissue Doppler findings

	Patients	Controls	P
IVSs	6,03±0,81	6,88±1,33	0,019
IVSe	11,03±1,55	13,20±1,62	0,000
IVSa	5,84±1,46	6,76±2,02	0,080
IVS ICT	59,63±1,94	56,50±8,92	0,418
IVS IRT	57,33±9,95	52,60±8,83	0,073
IVS ET	200,20±33,87	235,15±23,21	0,000
IVS MPI	0,59±0,95	0,45±0,05	0,000
LVs	5,61±1,02	7,81±1,08	0,000
LVe	13,88±2,3	15,83±2,36	0,007
LVa	6,20±1,49	6,91±1,41	0,480
LV ICT	60,48±14,12	57,90±9,62	0,654
LV IRT	63,90±11,12	56,10±9,33	0,006
LV ET	198,28±29,7	240,90±25,44	0,000
LV MPI	0,63±0,11	0,47±0,67	0,000
RVs	9,22±1,9	10,02±2,48	0,252
RVe	14,8±3,13	16,82±2,42	0,006
RVa	8,65±2,62	7,92±2,73	0,367
RV ICT	60,98±12,59	53,40±9,04	0,032
RV IRT	59,3±10,29	55,95±6,86	0,299
RV ET	195,93±30,62	233,80±24,98	0,000
RV MPI	0,61±0,1	0,46±0,06	0,000

Table 2: The speckle tracking echocardiographic findings

	Patients	Controls	P
LVLGS	22,73±4,46	25,45±3,92	0,045
LVLGSR	0,43±0,38	0,94±0,35	0,000
RVLGS	31,20±5,45	26,75±4,85	0,005
RVLGSR	0,75±0,48	0,99±0,32	0,000
LVCGS	28,50±7,42	28,90±5,29	0,660
LVCGSR	0,76±0,43	1,04±0,35	0,014