Quantitative Assessment of Systolic Right Ventricular Function and its Relationship with NT-proBNP in Patients with a Systemic Right Ventricle

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Objectives In patients with transposition of the great arteries (TGA) corrected by an atrial switch operation (D-TGA) and in patients with congenitally corrected TGA (L-TGA) dysfunction of the systemic right ventricle (RV) is a major concern. We evaluated RV longitudinal strain (LS) using speckle-tracking echocardiography (STE) in these patients, and assessed its relationship with conventional echocardiography and NT-proBNP. RV LS in patients was compared to RV LS in healthy controls.

Methods Echocardiography, electrocardiography and NT-proBNP measurements were performed in consecutive patients with D-TGA (corrected by Mustard surgery) or L-TGA on the same day. Healthy controls. With STE, we analyzed longitudinal strain of the RV lateral wall and septal wall.

Results Of the 40 patients with a systemic RV, 31 had a D-TGA and 9 patients had an L-TGA. The mean age was 36±7 years, 73% was male (34±4 years after corrective surgery). The 26 healthy controls had a mean age of 31±7 years and 46% was male. Longitudinal strain of the RV lateral wall tended to be lower in patients with D-TGA (-15.5±3.5%) than in patients with L-TGA (-16.1±3.6 %, p=0.052) and was significantly reduced compared to healthy controls (-26.4±4.5%, p<0.001). The reduced strain was most prominent in the apical segment (Figure 1). Median NT-proBNP level in the patients was 27.2 [IQR 17.6 – 53.9] pmol/l. RV LS correlated with RV apex-base diameter (r=0.54, p=0.001), RV fractional area change (r=-0.36, p=0.039), QRS duration (0.43, p=0.012) and NT-proBNP (r=0.53, p<0.001). No correlation between RV LS and TAPSE was observed.

Conclusions RV longitudinal strain is significantly reduced in the systemic RV of patients with D-TGA and L-TGA, especially in the apical RV segment. RV longitudinal strain is related to RV function and dimension, and shows a negative correlation with NT-proBNP, which indicates a possible prognostic value of strain in patients with a systemic RV.

Figure 1