

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

Eindhoven J.A., Menting M.E., Van den Bosch A.E., McGhie J.S., Geleijnse M.L., Witsenburg M., Boersma H., Roos-Hesselink J.W.
Erasmus Medical Center, Rotterdam, the Netherlands

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 ($-15.5 \pm 3.5\%$) than in patients with L-TGA ($-16.1 \pm 3.6\%$, $p=0.052$) and was significantly reduced compared to healthy controls ($-26.4 \pm 4.5\%$, $p<0.001$). 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

