Echocardiographic right ventricular function variables: external validity study in a normal pediatric population

Pediatric and Congenital Cardiology, University Hospital, Montpellier, France (1)
Pediatric Cardiology, Institut-St-Pierre, Palavas, France (2)
Biostatistics Department, University Hospital, France (3)

Introduction:
Regular echocardiographic assessment of right ventricular (RV) function is required in patients with congenital heart disease (CHD). Although normal values are validated in the adult population, less RV studies have been published in normal pediatric population. The aim of this study is to define in real clinical situation normal values for RV variables in children and to compare the results to published studies.

Methods:
We conducted a prospective multicenter study from 2010 to 2012 in our pediatric cardiology tertiary care center. 314 normal children (normal physical examination, electrocardiogram and echocardiography and no CHD, chronic disease or treatment) aged 2 days to 18 years were included (46% female, 88 infants under 1 year old, 26 neonates, 226 children). Following RV variables were collected by 4 pediatric cardiologists using 2 ultrasound systems (Philips IE33, Aloka Alpha 10): tissue Doppler imaging (TDI) E’, A’ and S waves at the tricuspid valve, TDI Tei Index and tricuspid annular plane systolic excursion (TAPSE). The impossibility to measure a variable was informed. A univariate polynomial linear regression was used to assess the relationship between these indexes and the anthropometric factors (age, weight, height, BSA and gender) via the coefficient of determination (R²).

Results:
More than 90% variables could be easily collected. Mean values for E’, A’ and S waves were: 13,7 ± 3,8 cm/s, 10,1 ± 3,7 cm/s, and 12 ± 2,2 cm/s; mean values for TAPSE were 18,7 ± 4,9 mm and 0,41 ± 0,11 for DTI Tei index. In infant, E’, A’ and S waves were best correlated with BSA, and TAPSE with height. In children S wave and TAPSE were best correlated with weight, and A’ with age. No significant correlation was found for E’ wave in children, and for DTI Tei index. No significant differences were found between genders, ultrasound systems. Values were mostly well correlated to published studies. The experience of the pediatric cardiologist had an impact on the results.

Conclusion:
We established echocardiographic RV function reference values in children with good feasibility and correlation to published reference studies. Routine application to children with CHD must be defined.