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Gender differences in right ventricular function of athlete's heart

Abstract: P1538

Gender differences in right ventricular function of athlete's heart

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Longitudinal shortening is considered to be the most important motion determining right ventricular (RV) function. However, the radial direction (“bellows” effect) can gain particular importance in certain conditions. Our aim was to quantify the longitudinal and the radial components of RV performance using three-dimensional (3D) echocardiography and assess their relative contribution to RV function in normal subjects versus elite female and male athletes.

Fourteen female and 15 male elite athletes competing in sport disciplines of combined exercise nature, and 14 age-matched healthy female volunteers were enrolled. Beyond conventional echocardiographic protocol, full volume datasets were acquired using multi-beat reconstruction from 4 or 6 cardiac cycles. Using dedicated software for RV 3D and speckle tracking analysis (4D RV-Function 2), 3D beutel model was created and exported volume-by-volume throughout the cardiac cycle. Beside end-diastolic (EDV) volume and total ejection fraction (TEF), we quantified longitudinal (LEF) and radial ejection fraction (REF) by decomposing the motion of each vertex of the reconstructed 3D beutel model along three orthogonal axes and omitting the other two directions.

EDV was higher in both athlete group compared to controls (female athletes vs male athletes vs controls; 98±25 vs 91±21 vs 68±26mL, ANOVA $p<0.05$). TEF was higher in female athletes compared to both groups (63±3 vs 48±3 vs 53±3%, $p<0.05$). LEF and tricuspid annular plane systolic excursion (TAPSE, conventional measure of RV longitudinal function) were similar. REF/TEF ratio was significantly higher in female athletes compared to both male athletes and controls (54±8 vs 47±11 vs 45±10%, $p<0.05$).

Current results suggest that there are considerable gender differences in terms of right ventricular function of athlete's heart. The increased ejection fraction of female athletes is attributable to the supernormal radial motion of the RV.