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Cardiac remodelling in elite rowers - insights from novel echocardiographic techniques

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Funding Acknowledgements: No financial support

Background

Chronic exercise training leads to cardiac remodelling; the so-called Athlete's Heart. Previous studies are often limited by a cross-sectional design whilst longitudinal training studies are often constrained to the assessment of non-athletes. Echocardiography provides comprehensive assessment of mechanics and may give additional insight into short-term changes in training volume in the elite athlete.

Purpose

To examine the impact of a short-term (9 months) increase in training volume on cardiac structure and mechanics in elite international competing rowers.

Methods

As part of the work-up to the 2012 Olympic Games, twenty-seven elite rowers (26.4 ± 3.7 years, 19 male) underwent baseline echocardiography prior to and post (9-months) a planned increase in training volume. Conventional echocardiographic indices including mechanics of all cardiac chambers were assessed.

Results

In response to increased training volume, there was a significant increase in left ventricular (LV) size (IVSd 9.2 ± 1.2 to 9.7 ± 1.1 mm, p = 0.001; PWd 8.3 ± 1.3 to 8.7 ± 1.4 mm, p = 0.013), LVIDd (56.5 ± 4.6 to 57.9 ± 4.2 mm, p = 0.001), and LVMi (90.2 ± 17.8 to 100.8 ± 17.1 g/m2, p = 0.000), see table. There was a significant increase in LV twist (9.2 ± 4.5 to 11.2 ± 4.7 °, p = 0.04; basal rotation -4.4 ± 3.1 to -4.5 ± 3.4 °, p = 0.84; apical rotation 5.8 ± 3.4 to 7.1 ± 3.7 °, p = 0.011), see figure, however, there were no changes in any other conventional indices of function or any other cardiac mechanics. There was a significant increase in left atrial (LA) volume (58.8 ± 15.2 to 65.3 ± 17.6 mm, p = 0.01) whilst no changes were observed in right heart structure.

Conclusion: An increase in exercise training volume in elite rowers across 9-months induced mild balanced structural remodelling of the LV and LA with a concomitant increase in LV twist. Contradictory to findings in non-athletes, there was no increase in right ventricular or atrial structure or function which may be representative of the elite athlete status and possibly already at threshold for physiological adaptation.

Abstract P784 Figure.