Imaging

LEFT VENTRICULAR HYPERTROPHY IN ATHLETES IS CHARACTERISED BY SUPERNORMAL MYOCARDIAL BLOOD FLOW RESERVE PREDOMINANTLY DUE TO IMPROVED CAPILLARY RECRUITMENT AS ASSESSED BY QUANTITATIVE MYOCARDIAL CONTRAST ECHOCARDIOGRAPHY

Poster Contributions
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Authors: Rajesh Chelliah, Greg Whyte, Sanjay Sharma, Antonis Pantazis, Roxy Senior, Northwick Park Hospital, Harrow, United Kingdom, Royal Brompton Hospital, London, United Kingdom

Background: Athletes develop physiological left ventricular hypertrophy (LVH) as a consequence of enhanced training. Microcirculatory changes consequent to physiological LVH is relatively unknown. We hypothesised that LVH in atheletes is characterised by supernormal myocardial blood flow reserve (MBFR) due to improved capillary recruitment.

Methods: Accordingly 25 endurance athletes with physiological LVH and 10 age and sex matched control subjects were recruited. There were no significant difference in age (33±8 yrs, 34±5yrs; p=0.50), and gender (Males-athletes:25, controls:7). All underwent 2-dimensional echocardiography and tissue Doppler imaging followed by rest and stress vasodilator myocardial contrast echocardiography(MCE). Quantitative analysis of capillary blood volume [CBV (dβ)], blood velocity (dβ/s), myocardial blood flow [MBF(db/s2)] and MBFR (stress MBF/rest MBF) of the septum and apex was performed.

Results: Athletes had significantly thicker septum compared to controls (14.01±0.89mm; 10.67±0.05mm; p=0.01), larger left atrium (5.1±1.1cm; 3.3±0.3cm; p=0.02) and better longitudinal function, medial S wave (9.45±3.86cm/s; 6.8±1.39cm/s; p=0.01). Athletes had a higher CBV at rest compared to controls (18.3±12.6; 16.75±8.34; p=0.05), but similar blood velocity (1.96±0.5; 1.70±1.01; p=0.78). This translated to higher MBF in athletes vs control (36.1±14.7; 30.7±5; p=0.02). At stress, the CBV further increased in athletes compared to controls (41.02±10; 30.35±7.4; p=0.04), but with similar blood velocity (4.41±1.2; 2.8±2.0; p=0.71) but consequent higher MBF in athletes (180.81±19.9; 85.0±36.1; p=<0.01). This resulted in significantly higher MBFR in athletes compared to controls (5.67 vs 2.8, p=0.01). The receiver-operator characteristics (ROC) curve for MBFR demonstrated areas under the curve of 0.85. A cut-off of MBFR of 2.2 provides a sensitivity and specificity of 95% and 74% respectively for predicting athletes heart.

Conclusion: Quantitative MCE suggests that LVH in athletes is characterised by supernormal myocardial blood flow reserve (MBFR) due to improved capillary recruitment.