Abstract

**Background:** We investigated the acute cardiac consequences of a long-duration (>5 h) adventure race in adolescent athletes from evaluations of left ventricular (LV) strains and myocardial work.

**Methods:** Twenty trained male adolescents (i.e. 8 ± 4 hours/week of endurance sports) aged 14 to 17 years participated in a competitive long-duration adventure race. Blood samples were collected before, immediately and 24 h after the race to determine the time course of troponin I (cTnI) considered as a myocardial damage biomarker. Resting echocardiography were conducted before and after the race to assess myocardial regional strains, LV twisting mechanics and myocardial work using speckle tracking echocardiography.

**Results:** The mean completion time of the race was 05:38 ± 00:20 h, with a mean heart rate (HR) of 83 ± 5% of maximal HR. cTnI concentration significantly increased in 16/20 participants after the race (pre: 0.001 ± 0.002 vs. post: 0.244 ± 0.203 ng·dL⁻¹, p < 0.001) and returned to baseline within 24 h. Stroke volume, ejection fraction and global longitudinal strains remained unchanged after the race while LV twist
and global myocardial work significantly decreased (8.6 ± 3.3 vs. 6.3 ± 3.3 deg and 2080 ± 250 vs. 1781 ± 334 mmHg%, p < 0.05). Diastolic function, indexes of myocardial relaxation and LV untwisting rate (-91.0 ± 19.0 vs. -56.4 ± 29.1 deg·s⁻¹, p < 0.001) were affected after the race.

**Conclusion:** We demonstrated for the first time that, in trained adolescents, a high-intensity endurance exercise of several hours induced an increase of the cTnI concentration associated with an alteration of myocardial function.

**Keywords:** left ventricular strains; long-duration exercise; myocardial work; young athletes.
