

Atrial functional and geometrical remodeling in highly trained male athletes: for better or worse?

Gabrielli, L., Bijmens, B.H., Butakoff, C., Duchateau, N., Montserrat, S., Merino, B., Gutiérrez, Sitges, M. (2014). Atrial functional and geometrical remodeling in highly trained male athletes: for better or worse?. *Eur J Appl Physiol* 114, 1143–1152.

<https://doi.org/10.1007/s00421-014-2845-6>

Abstract

Purpose

Highly trained athletes have an increased risk of atrial arrhythmias. Atrial geometrical and functional remodeling may be the underlying substrate. We analyze and relate atrial size, deformation and performance in professional handball players compared with non-sportive subjects.

Methods

24 Professional handball players and 20 non-sportive males were compared. All subjects underwent an echocardiographic study with evaluation of left (LA), right atrial (RA) dimensions and deformation by strain (Sa) and strain rate (SRa). Atrial performance was assessed from the atrial stroke volume (SV). With computational geometrical models, we studied the relation between atrial volumes, strains and SV and compared atrial working conditions. We estimated the functional reserve and a resulting average wall stress.

Results

LA and RA volumes were larger in athletes than in controls (35.2 ± 8.8 vs. 24.8 ± 4.3 ml/m², $p < 0.01$ and 29.0 ± 8.4 vs. 19.0 ± 5.1 ml/m², $p < 0.01$ respectively). LASa and RASa during active atrial contraction were decreased in

athletes (-12.2 ± 2.0 vs. -14.5 ± 2.1 %, $p < 0.01$ and -12.1 ± 1.8 vs. -14.2 ± 1.5 %, $p < 0.01$ respectively). LASV was similar between groups (6.6 ± 1.4 vs. 7.3 ± 1.1 ml, $p = 0.19$) and RASV was lower in athletes (6.2 ± 1.3 vs. 7.2 ± 1.1 ml, $p < 0.01$). Computational models showed that this different operational mode potentially increases performance reserve, but at the cost of higher atrial wall stress.

Conclusion

A proportion of athletes with enlarged LA and RA showed different atrial contractile performance, likely resulting in atria working at higher wall stress.