Stefani et al sought to comprehensively assess LV function by using 3D echo-derived strain imaging in three groups: athletes, athletes with BAV, and a control group.

Their hypothesis was that 3D strain and principal strain analysis (PSA) may improve the physiological understanding of LV function and may help relate function with structure.

The aim is interesting, the paper reads well and the authors have several previous publications in the field.

There were no significant differences in terms of conventional strain values (either 2D or 3D), between the 3 groups. Also, among the novel strain parameters, PS was very similar, and it was only SS that was different (significantly higher in athletes).

Based on this difference the authors speculate about the effect of training as an explanation and also try to infer some possible speculative explanations related to myocardial structural changes.

I have several comments.

The authors should better explain their choice of including a group of athletes with BAV.

In the absence of a gold standard the authors have used 2D strain to verify the reliability of their 3D strain results. However, this does not apply for PSA, which is only available in 3D and for which there was no comparator available.

As such, the meaning of the difference found is difficult to interpret.

In the presence of small groups (2 of 15, 1 of 20 subjects, a limitation acknowledged by the authors) the differences noted only in a secondary parameter need to be interpreted with caution. This is particularly important as the difference involves novel parameters about which there is a paucity of data.

Issues of validation, reproducibility and normal values particularly related to PS and SS need to be carefully addressed as these are critical to the study results. The potential clinical implications/applications of such parameters in the described setting need to be discussed.

Minor comments

I suggest the authors provide in a separate table all the 2D strain information as well.
This would provide a more complete information about the study groups.

It is not clear why the LVEF was not measured in the standard way, using LV volumes to derive it, particularly since 3D datasets were available. I suggest the authors provide this information. I also believe that providing LA volumes (instead of only linear dimensions) and more data about diastolic function (ie e' values) would help a better description of cardiac structure and function in these groups.

Some typos need to be corrected (eg page 10, line 16 - it should read were, not where: ...functional changes at rest were limited...)

The use of expressions such as "ceteris paribus" would better be avoided for the sake of text clarity.

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.