Author's response to reviews

Title: Characterization of a calcified intra-cardiac pseudocyst of the mitral valve by magnetic resonance imaging including T1 and T2 mapping

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Author's response to reviews: see over
Dear Prof. Ashraf Anwar,
dear Editorial Board of BMC Cardiovascular Disorders,

It is with great pleasure that we resubmit our revised manuscript (MS: 1154500006113415)

**Characterization of a calcified intra-cardiac pseudocyst of the mitral valve by magnetic resonance imaging including T1 and T2 mapping**

Ursula Reiter, Gert Reiter, Martin Asslaber, Drago Dacar, Ralph Maderthaner, Josepha Binder, Andreas Greiser, Meinrad Beer, Michael Fuchsjäger

for publication as Case Report. We corrected the manuscript following the suggestions of the reviewers and marked all changes in the resubmitted Case Report. To ensure correct formatting, we used the template file from your homepage. Please find below also the point-by-point response to the reviewers’ comments.

Best regards,

Ursula Reiter
on behalf of all co-authors
Point-by-point response to the Reviewers’ comments

Reviewer 1:

The manuscript (unfortunately no page numbers) …
We are sorry for this. We reformatted the resubmitted manuscript using the BMC article template file, to ensure to use the correct format.

1) The contrast uptake during first pass was rather negligible as indicated by the signal-over-time curve. This is expected from a cystic lesion as indicated in other reports (Table). Therefore the authors may consider to adjust their report. Such a tiny amount of contrast uptake in the lesion should not be taken as point to rule out a cyst and indeed as a bottomline the authors suspected a cyst after CMR.
We agree with the reviewer that the first pass contrast agent uptake of the lesion is small and this was also the reason to not rule out a cystic lesion. We adjusted the argumentation on page 7. It is however interesting to note, that cystic lesions – in contrary to reports in literature - can show first pass perfusion contrast agent uptake.

2) The authors cite one case report (ref. #16) to corroborate that the lack of LGE would exclude endocarditis. Given the paucity of CMR data regarding endocarditis this statement should be eliminated.
We eliminated the statement about endocarditis (page 7). For consistency, we summarized “hydradid cyst, blood cyst, and cyst caused by endocarditis” by the term “intra-cardiac cystic lesion” (page 5).

3) If the authors want to point out the importance of mapping in this case, they should expand the discussion in this regard. What do the T1- and T2-times mean? From the reviewer’s point of view it is not enough to state, that the numbers „were compatible with precontrast signal characteristics. If so, there is no need to obtain maps. For the clinically oriented readers the authors might explain what „high proton density in the mass“ means.
We followed this suggestion and added a paragraph dealing with the possible advantage of assessment of quantitative magnetic relaxation times over qualitative MR signal intensity in the background section (page 4). At the moment it is of course to some extent speculative, because no “normal ranges” for T1 and T2 times of cardiac masses exist.

Signal intensity and contrast generation in MR sequences is ultimately described by formulas/functions depending on T1, T2 and proton density as well as sequence and
physiological parameters like echo time, repetition time, flip angle, and heart rate. Entering all these parameters into respective formulas, allows to estimate if the signals of two tissues will appear similar (isointense) or different (hypointense/hyperintense). As T1 and T2 mapping provided T1 and T2 times, they enable such estimations and the result was summarized in the word “compatible”. To clarify we rewrote the paragraph (and also the assumption of high proton density in the mass) in the CMR imaging section (page 7,8), and added a reference [18].

However, T1 and T2 values are quantitative measures, which allow more detailed (and quite likely more stable) tissue differentiation, which is indicated also in the analysis of the cysts content.

4) Hemorrhagic cyst: T1-times between intraventricular blood and and blood within a cyst may differ depending e.g. on blood degradation and flow. Occasionally T1-time of blood might even differ between cardiac cavities. Please comment.
We completely agree. There is for example a linear relationship between T1 times and hematocrit, and methodologically the imaged blood must “feel” the inversion pulses of MOLLI sequence to give correct T1 values. However, as we indicated also by reference [19], “old” blood should have shorter T1 times than “viable” left and right ventricular blood, the larger T1 in the cyst excludes pure blood in the lesion. To clarify, We rewrote this statement (page 8).

5) The conclusion should be toned down a bit. The authors state, that „mapping can be used to evaluate the nature of a lesion’s content...“ It is not really clear whether there was indeed an additional benefit of mapping compared to conventional imaging in this case.
We followed this suggestion and rewrote the conclusion (page 8, 9).

Reviewer 2:

1. The author reports that the echocardiographic finding had thrombosis of the aortic arch and descending aorta and this finding was obtained from the TTE in addition to the mass attached to the mitral valve. Why the patient did not perform transesophageal echocardiography and sent for Cardiac CT which gave modest result.
Thank you for the comment, in fact the echo findings was the result of transthoracic and transesophageal echo. We added TEE on page 5.

2. The MRI reported that the mass is calcified cystic mass which usually doesn’t cause embolization except after rupture so what is ur explanation to recurrent emboli.
The explanation for recurrent embolic events remains speculative: There are 3 case reports [Ref 1-3], where embolic events are caused by intra-cardiac cystic lesions without rupture. However, after removal of the cyst, no further embolic events appeared.

3. What about the MRI findings of the arch and descending aorta as regard to the thrombosis reported by the TTE which may be the main source of recurrent emboli. Aortic arch and descending aorta were free of thrombosis in CT. We added this finding in the case report section on page 5.