

Peer Review File

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Reviewer A:

Method

1. "Patient follow-up was conducted for up to two years post-STEMI." "Over a median follow up 607 days (IQR 438-730 days)." The data looks contradictory.

Reply 1: Follow up was conducted for up to two years (ie 730 days) post-STEMI, however some patients were followed up for a shorter period, hence the median follow up was 607 days.

Changes in the text: Nil

Result

2. LA parameters should be included in Table 1.

Reply 2: Yes, we have made this change.

Change in the text: Please see updated Table 1.

3. "Left atrial ejection fraction (LAEF) has emerged as a volumetric measure of global LA systolic function which correlates with left ventricular ejection fraction (LVEF) and infarct size in STEMI". Seems not the case in this study. Likewise the correlations are quite moderate.

Reply 3: Yes, we agree the correlations are quite moderate between LAEF and LVEF and LAEF and infarct scar size. We have added this to the discussion.

Change in the text: Please see page 16-17. "Similar to Ledwoch et al., we found that there was a modest positive correlation between LAEF and LVEF ($r = 0.373$), and a modest inverse correlation between LAEF and infarct scar size ($r = -0.399$)."

4. "The addition of LA reservoir strain to LVEF resulted in a significant increase in AUC from 0.713 (95% CI: 0.608-0.818) for LVEF alone to 0.775 (95% CI: 0.680-0.870) for LVEF and LA reservoir strain ($p = 0.047$)". The addition of LA reservoir strain does not seem to add much to LVEF.

Reply 4: AUC analysis shows that LA reservoir strain has additive value in MACE prediction over and above LVEF, which we believe is an important finding considering LVEF is currently our most widely used risk predictor post STEMI in guiding heart failure therapy.

Change in the text: Please see page 16. "This is an important finding considering LVEF is currently the most widely used risk predictor post STEMI in guiding heart failure therapy. By comparison, Ledwoch et al. found that LAEF did not have an additive value in terms of MACE prediction after acute MI over and above LVEF (3), highlighting the utility of phasic measures such as LA reservoir strain over volumetric indices."

Discussion

5. The discussion is underdeveloped. How is your study novel? Please expand discussion to include other reports of LA predictors.

Reply 5: We have further developed our discussion specifically addressing how the study is novel and including other reports of LA predictors.

Change in the text: Please see pages 16 and 17.

“One limitation of the study by Schuster et al. was that assessment of diastolic function was not performed, and hence the authors could not assess the effect of diastolic dysfunction on LA strain or exclude the possibility that changes in atrial function reflected ventricular diastology (7). By comparison, our study is novel because we have assessed diastology with a paired CMR and transthoracic echocardiogram for each patient and have adjusted for diastolic dysfunction and mitral regurgitation severity.”

“LAVI_{max} is predominantly a marker of chronically elevated LV filling pressure, whereas LAVI_{min} is more sensitive to changes in atrial afterload and atrial elastance (1). Lonborg et al. showed that LAVI_{max} is not associated with acute LV function but determined by pre-existing conditions, whilst LAVI_{min} is determined by acute changes in LV function such as acute stunning and infarct size as well as pre-existing conditions (4).”

Conclusion

6. “and may have a future role in improving prognostication after STEMI”. This seems to be an overstatement of the case, CMR plays a role in evaluation, not intervention. Should be toned down or expounded in the discussion section.

Reply 6: Yes, we have changed this.

Change in the text: Please see page 18. It now reads “and may have a future role in improving risk stratification after STEMI”.

Reviewer B:

Interesting paper that adds to the prognostic value of LA strain.

Introduction

1) Could the authors elaborate further on the LA Reservoir strain and LA Booster strain. While the evidence has been established, it is relatively novel concept for non-CMR readers and it would be beneficial for them.

Reply 1: Yes, we have added this.

Change in the text: Please see page 3. “LA reservoir strain represents the phase of pulmonary venous return during ventricular systole. LA booster strain corresponds to active atrial contraction, and accounts for the late-diastolic augmentation in ventricular filling which is absent in atrial fibrillation (AF).”

Methods

Was SSFP acquisition used for Cine imaging. Please specify that

Reply 2: Yes, we have mentioned this on Page 4. “Cine images, using a steady state free precession pulse sequence, were acquired in standard short- and long-axis views”

Change in the text: Nil.

Results

Could the authors include the LA volumetric and strain indices into table 1

Reply 3: Yes, we have made this change.

Change in the text: Please see updated Table 1.

Discussion

4) Can the authors elaborate further on how LA reservoir strain reflects intrinsic LA function

Reply 4: Yes, we have made this change.

Change in the text: Please see page 16. “LA reservoir strain reflects atrial compliance and to a lesser extent, atrial contractility and relaxation, modulated by descent of the LV base during systole.”

5) Can the author explore further the role/ relationship of diastolic dysfunction/LA reservoir strain and prognosis considering the diastolic dysfunction is much higher in the MACE group.

Reply 5: Yes, we have made this change.

Change in the text: We have added to the results section on pages 10 and 15. “Patients with MACE more frequently had grade 3 diastolic dysfunction than patients without MACE (20% vs 6%, $p = 0.007$).” “One way ANOVA showed no significant difference in mean LA reservoir strain between normal diastolic function ($29.4\% \pm 7.8\%$), grade 1 diastolic dysfunction ($27.1\% \pm 8.3\%$) and grade 2 diastolic dysfunction ($27.9\% \pm 9.4\%$), however were significantly higher than patients with grade 3 diastolic dysfunction ($15.8\% \pm 9.1\%$, $p < 0.001$ for all).”

In the discussion section, we have added on page 16. “This is particularly important because recent studies have demonstrated a linear decrease in LA reservoir strain with increasing grades of diastolic dysfunction (21, 22), and significant diastolic dysfunction has been shown to be an independent predictor of adverse outcomes post MI (23).”