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THE AUTHORS REPLY:

We thank Dr. Ren and colleagues for their interest in our study (1) and appreciate their comments.

We acknowledged that cine-cardiac magnetic resonance (CMR) and contrast-enhanced magnetic resonance angiography (MRA) carry limitations; using only these sequences would therefore undoubtedly be suboptimal for detection of left atrial/left atrial appendage (LA/LAA) thrombi. We respectfully disagree, however, that long inversion time delayed enhancement cardiac magnetic resonance (long TI DE-CMR) infers the presence of thrombus; rather, it directly visualizes thrombus and is able to distinguish it from surroundings based on the unique post-contrast tissue characteristics of the thrombus. In addition, it is not affected by sluggish LAA filling because it is performed in the equilibrium phase. Thus, it was the optimal CMR sequence for LA/LAA thrombus detection.

We are unclear as to the limitation suggested in the letter that transesophageal echocardiography (TEE) with equivocal LA/LAA thrombus were excluded from our study. On the contrary, all TEEs were adjudicated by a consensus of 2 Level III-trained echocardiographers, using criteria outlined in the Methods section, as either thrombus or no thrombus (1). There were no cases classified as equivocal according to TEE, which was used as the reference standard.

The objective of our study was to determine if LAA thrombus could be reliably excluded at the time of CMR imaging for pulmonary vein (PV) mapping, potentially obviating the need for TEE. Although it is true that long TI DE-CMR was unable to exclude LAA thrombus, resulting in equivocal findings in 2 cases, this scenario represented <1% of 261 studies. Furthermore, long TI DE-CMR was able to detect all thrombi identified by using TEE, resulting in no false-negative findings.

Ren et al. highlighted their satisfactory experience with intracardiac echocardiography (ICE). ICE has unquestionable value for procedural guidance during PV isolation. In 56 selected cases, Ren et al. (2) proved the utility of ICE for assessment of LAA thrombi. However, despite the better spatial resolution with ICE than with the CMR sequences tested, it remains to be validated for pre-procedural imaging in a larger, unselected cohort such as ours. In addition, ICE requires considerable operator skill and experience, particularly for LAA imaging. Examples provided in the letter by Ren et al. certainly support ICE's potential. Although we agree with the utility of ICE intraprocedurally, and concur with its value for equivocal cases, it does not provide other in toto imaging assessment to constitute a reproducible, 1-stop imaging strategy before PV isolation. Because patients who are referred for PV isolation typically need tomographic imaging, adding CMR sequences for LA/LAA thrombus detection that are noninvasive, require no additional contrast, and have acceptable diagnostic performance could provide valuable information to the clinician and potentially reduce pre-operative testing. Further studies with multicenter investigation and larger sample size are certainly welcome. Nonetheless, in our opinion, CMR could serve as gatekeeper for patients referred for PV isolation, with more invasive testing (TEE/ICE) reserved for equivocal CMR results for LA/LAA thrombus.

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http://dx.doi.org/10.1016/j.jcmg.2016.10.002

Please note: The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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