

LETTERS TO THE EDITOR

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Is cardiac magnetic resonance imaging a game changer in re-ablation of atrial fibrillation?

We read with interest the article recently published by Quinto *et al.*¹ in *EP Europace*. This retrospective case–control study aimed to analyse whether using delayed enhancement cardiac magnetic resonance imaging (DE-CMR) to localize veno-atrial gaps in atrial fibrillation (AF) redo-ablation improved outcomes during follow-up. From June 2012 to November 2014, the authors included 35 case patients who underwent a Re-PVI guided by DE-CMR and 35 control patients who underwent a Re-PVI following the conventional circular-guided approach without CMR. At 2-year follow-up, more patients in the DE-CMR-guided group remained free from atrial arrhythmia compared with the conventional group.

Firstly, this study closely matches the design and results of a previous study conducted by the same team and published in 2014 on 15 cases compared to 15 control patients.² The authors did not specify if these 15 patients are included in the present analysis, thus limiting the original data at 20 new case patients. This could be an important limitation to acknowledge.

Moreover, the authors explained mainly their results by technical limitations such as the failure of a standard circular-catheter to identify the exact location of conduction gap. However, in the case-group, if isolation had not been achieved by DE-CMR-guided procedure, further radiofrequency applications were applied after mapping with circular-catheter. This biases interpretation of the results in the DE-CMR-group, since some of the DE-CMR-patients have in fact benefitted from complete PVI thanks to the use of circular-catheter. Authors did not report the rate of case-patients needing additional applications which may represent a limitation.

In addition, only atrial flutter-free survival is significantly lower in the DE-CMR-guided group. There is no data reported on these atrial flutters. If these atrial flutter were mostly related to cavo-tricuspid isthmus-dependent macro-reentrant arrhythmias, the association between DE-CMR-strategy and arrhythmia-free survival would be meaningless, even if statistically significant. Indeed, how could then the authors explain that a procedure, in the left atrium only,

could impact the occurrence of common atrial flutter.

As underlined by the authors, the case–control retrospective design exposes to potential undetected biases. Thus, it's inaccurate to conclude DE-CMR-strategy is associated with a procedure time reduction. The absence of a significant reduction in radiofrequency time, which would be expected in DE-CMR-group, supports our point. Moreover, the procedure's duration remains longer than that reported in CLOSE-protocol and higher-power-CLOSE approach (even if including only first PVI), respectively 161 ± 52 , 149 ± 33 , and 82 ± 18 min.³ This difference could be explained by the systematic use of contact-force-catheter in recent studies, which was used in less than one-fifth of patients of the present study. Given that contact-force-catheter are widely used nowadays, the results obtained from ablations performed between 2012 and 2014 seem unlikely to match our current practice. Considering the foreseeable expansion of AF ablation indications, such a reduction in procedure duration would be welcome, allowing a better meet to the growing demand.⁴

All of these elements underline the importance to develop new tools allowing optimization of pulmonary veins isolation (PVI). Cardiac magnetic resonance, by allowing non-invasive identification of myocardial scar, appears to be a relevant examination in the future, as well as emerging technologies such as pulsed-field ablation.⁵

Conflict of interest: none declared.

References

1. Quinto L, Cozzari J, Benito E, Alarcón F, Bisbal F, Trotta O *et al.* Magnetic resonance-guided re-ablation for atrial fibrillation is associated with a lower recurrence rate: a case–control study. *Europace* 2020; **22**:1805–11.
2. Bisbal F, Guiu E, Cabanas-Grandío P, Berrueto A, Prat-Gonzalez S, Vidal B *et al.* CMR-guided approach to localize and ablate gaps in repeat AF ablation procedure. *JACC Cardiovasc Imaging* 2014; **7**:653–63.
3. Philips T, Taghji P, El Haddad M, Wolf M, Knecht S, Vandekerckhove Y *et al.* Improving procedural and one-year outcome after contact force-guided pulmonary vein isolation: the role of interlesion distance, ablation index, and contact force variability in the "CLOSE"-protocol. *Europace* 2018; **20**:f419–27.
4. Wazni OM, Dandamudi G, Sood N, Hoyt R, Tyler J, Durrani S *et al.* Cryoballoon ablation as initial therapy for atrial fibrillation. *N Engl J Med* 2021; **384**:316–24.
5. Reddy VY, Neuzil P, Koruth JS, Petru J, Funosako M, Cochet H *et al.* Pulsed field ablation for pulmonary vein isolation in atrial fibrillation. *J Am Coll Cardiol* 2019; **74**:315–26.

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Is cardiac magnetic resonance imaging a game changer in re-ablation of atrial fibrillation?—Authors' reply

We appreciate the Hammache *et al.* interesting insights on our recent paper in *Europace*.¹ They raise a series of interesting concerns and comments that warrant further discussion and clarification.²

We appreciate their timely comments on topics that had only been briefly addressed in our manuscript. Indeed, in a proof-of-concept study, we previously reported on the feasibility and acute efficacy of delayed-enhancement cardiac magnetic resonance (DE-CMR) to re-isolate pulmonary veins.³ Patients in the present study had not been included in the original pivotal study.³ Hammache *et al.* are also concerned on the type of recurrence after ablation. In our study, a diagnosis of recurrent arrhythmia was reached by mean of 12-lead electrocardiogram (ECG) or 24-h ECG Holter monitoring. Although the seven atrial flutter recurrences were labelled as left atrial flutter by the treating electrophysiologist, the localization of the macro-reentrant circuit was not confirmed in an electrophysiological study. Because potential limitations in ECG interpretation,⁴ we felt that further subanalyses based on flutter origin may be inaccurate and misleading.

The reasons behind a shorter duration of the ablation procedure in the DE-CMR group could not be clarified in our study. Certainly, while we found significant differences in the total procedural time, this was not the case for radiofrequency and fluoroscopy time, for which a clear reduction in the DE-CMR group did not meet statistical significance. Large inter-individual variability likely rendered our study underpowered to detect significant differences in each of these items. Moreover, tasks others than the