LETTERS TO THE EDITOR

Safety profile of pulsed field ablation regarding phrenic nerve function

We read with great interest the comprehensive review by Sugrue and colleagues.[1] Pulsed field ablation (PFA) is a promising, nonthermal energy allowing efficient pulmonary vein isolation during atrial fibrillation catheter ablation. However, uncertainties persist regarding the impact of PFA on right phrenic nerve (PN) function, with a subsequent risk of PN stunning (ie, transient) or palsy (ie, persistent). Indeed, data from the recently published MANIFEST-17K (Multi-National Survey on the Safety of the Post-Approval Clinical Use of Pulsed Field Ablation in 17,000+ Patients) registry found a low incidence (0.06%) of PN palsy,[2] but such a complication might have been overlooked by the retrospective design of the study and the absence of systematic PN function monitoring during PFA procedures. This assumption is corroborated by several descriptions of alterations of PN function.[3,4] Catheter ablation of ectopic beats triggering AF and originating from the superior vena cava has been hypothesized to improve AF catheter ablation efficacy[5] but with a risk of collateral lesion of the right PN.[6] We recently published our experience regarding successful PFA-based superior vena cava isolation in 105 patients.[7] Using compound motor action potential monitoring, we found that 64% of patients experienced PN stunning, with a similar dose-effect relationship as previously described.[4] However, there was no evidence of PN palsy at the end of the procedure, even though minimal residual stunning could still be present. Importantly, there was still no clinical sign of PN palsy at 3-month follow-up. In conclusion, our study as well as previously published data[8,9] reinforce the fact that PFA seems to carry a good safety profile regarding PN function. However, vigilance must remain, and dedicated studies using systematic monitoring of PN and/or diaphragmatic function are definitely needed.

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Funding Sources: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Disclosures: The authors have no conflicts to disclose.

Authorship: All authors attest they meet the current ICMJE criteria for authorship.

References

1. Sugrue A, Shabtaie S, Tan NY, Maor E, Kapa S, Asirvatham SJ. Considerations regarding safety with pulsed field ablation for atrial fibrillation. Heart Rhythm O2 2024;5:655–661.
2. Ekanem E, Neuzil P, Reichlin T, Kautzner J, Van Der Voot P, Jais P. Safety of pulsed field ablation in more than 17,000 patients with atrial fibrillation in the MANIFEST-17 K study. Nat Med 2024;30:2020–2029.
3. Schmidt B, Bordignon S, Neven K, et al. European real-world outcome with pulsed field ablation in patients with symptomatic atrial fibrillation – lessons from the multicenter EU-PORIA Registry. Europace 2023;25:euad185.
4. Franceschi F, Koutbi L, Maille B, Deharo JC. First electromyographic monitoring of a progressive phrenic nerve palsy in a pulsed field ablation procedure. Heart Rhythm Case Rep 2024;10:447–450.
5. Lin WS, Tai CT, Hsieh MH, et al. Catheter ablation of paroxysmal atrial fibrillation initiated by non-pulmonary vein ectopy. Circulation 2003;107:3176–3183.
6. Wei HQ, Guo XG, Sun Q, et al. Electrical isolation of the superior vena cava using second-generation cryoballoon in patients with atrial fibrillation. J Cardiovasc Electrophysiol 2020;31:1307–1314.
7. Ollitrault P, Chaumont C, Font J, et al. Superior vena cava isolation using a pentaspline pulsed-field ablation catheter: feasibility and safety in patients undergoing atrial fibrillation catheter ablation. Europace 2024;26:euae160.
8. van Driel VJHM, Neven K, van Wessel H, Vink A, Doevendans PAFM, Wittkampf FHM. Low vulnerability of the right phrenic nerve to electroporation ablation. Heart Rhythm 2015;12:1838–1844.
9. Howard B, Haines DE, Verma A, et al. Characterization of phrenic nerve response to pulsed field ablation. Circ Arrhythm Electrophysiol 2022;15:e010127.

Reply: Safety profile of pulsed field ablation regarding phrenic nerve function

We thank Ollitrault and colleagues for their thoughtful commentary on our review.[1] Their recent study[2] significantly enhances our understanding of pulsed field ablation (PFA) safety, particularly with respect to phrenic nerve (PN) function during superior vena cava (SVC) ablation. In their study, the pentaspline PFA catheter was used for ablation in the SVC, and a mean of 6 ± 1 applications was applied at the SVC/right atrial junction (notably, the total number of PFA applications was determined at the operator's discretion, ranging from a minimum of 4 to a maximum of 8 applications). Determination of acute isolation was not clearly defined (ie, entrance or exit block), but the acute safety results showed promise.

The study's finding of a high incidence of transient PN stunning (64%) without any cases of persistent palsy is particularly informative. These findings support PFA's favorable safety profile while highlighting the importance of systematic PN function monitoring. While the authors' use of compound motor action potential monitoring provided valuable safety assessment, it is unclear whether the number of delivered lesions was adjusted in response to compound motor action potential changes or if a dose-dependent effect was observed. Additionally, if the initial ablation lesion was successful in acutely isolating the SVC, the necessity for subsequent applications remains uncertain.

Ollitrault and colleagues' team also noted a 4.7% incidence of transient high-degree sinus node dysfunction, which resolved by discharge without recurrence at follow-up. This finding underscores the importance of understanding

https://doi.org/10.1016/j.hroo.2024.11.013