

EDITORIAL COMMENT

Evaluating a Prior Cavotricuspid Isthmus Ablation Line at the Time of Atrial Fibrillation Ablation

Another Weak Link in the Chain!*

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Wide antral circumferential pulmonary vein isolation (PVI) has become the cornerstone of atrial fibrillation (AF) ablation (1). Ablation targets beyond PVI are continuously being evaluated to reduce atrial arrhythmia recurrence. Until now, there has been no further advancement in the field beyond standard PVI for both paroxysmal and persistent AF ablation.

In patients undergoing AF ablation with a history of typical atrial flutter and in those where typical atrial flutter is inducible at the time of AF ablation, creation of a cavotricuspid isthmus (CTI) ablation line is recommended in current guidelines (1). However, prophylactic CTI ablation during AF ablation in patients without atrial flutter has not been shown to improve arrhythmia-free survival (2). Also, the addition of alternative linear lesion sets (roof line and mitral valve isthmus line) does not improve outcomes in patients with persistent AF (3). One likely explanation of these findings is the poor durability of ablation lines, with a significant proportion of patients demonstrating resumption of conduction

across previous ablation lines during repeat catheter ablation procedures (4,5).

SEE PAGE 989

In this issue of *JACC: Clinical Electrophysiology*, Yoneda et al. (6) assess the prevalence of conduction recovery after CTI ablation when performed with or without concomitant AF ablation. In this retrospective study, patients undergoing AF ablation (initial or redo) who had undergone prior CTI ablation (either as a stand-alone procedure or as part of an AF ablation procedure) had conduction across the CTI line checked. In total, 295 patients who had previously undergone CTI ablation were eligible for inclusion. Of those, 122 had an index CTI stand-alone ablation, and 173 had an index CTI ablation accompanied by PVI (CTI + PVI). At the time of repeat ablation, information regarding conduction recovery across the CTI line was only available in 232 patients (93 with a history of stand-alone CTI ablation, and 139 with a history of combined CTI + PVI). In those with a history of stand-alone CTI ablation, 12 (12.9%) of 93 had conduction recovery, whereas in those with a history of CTI + PVI, 72 (51.8%) of 139 had conduction recovery. The odds of conduction recovery across the CTI were higher after a combined CTI + PVI procedure. This difference persisted (although to a lesser extent) after a sensitivity analysis for missing data, in which all the cases with missing CTI outcome status were assumed to have recovered conduction. Of note, among the group of patients undergoing combined CTI + PVI, only 42 (24%) had documentation of typical atrial flutter before the ablation procedure. The authors describe that despite a high rate of reconnection across the CTI line, only 4.07% of the overall sample exhibited typical atrial flutter recurrence.

There are a few caveats to this study (6), the most important of which is that the comparison between

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the 2 groups in the study is akin to comparing apples to oranges. The index procedures in patients undergoing stand-alone CTI ablation compared to those undergoing CTI + PVI were performed differently with respect to the use of irrigated ablation catheters and contact force utilization. Other differences not accounted for may also include the use of sheaths for catheter stability, anesthesia type, operator fatigue and a waiting period post-CTI ablation to test durability of conduction block. It is also plausible that empirical CTI ablation performed after a PVI procedure may not be performed with the same rigor and attention to endpoints, such as the assessment of persistent conduction block after ablation, as is routinely performed after a stand-alone CTI procedure.

In addition, the 2 groups differed with respect to the arrhythmia substrate (6). Patients with recurrent AF despite previous PVI may have factors such as larger atrial size, thicker atrial musculature and greater burden of atrial scar that may be indicators of more advanced atrial disease states. These factors may have contributed to the higher incidence of CTI conduction recovery noted in this study.

Another factor for consideration is that patients undergoing empiric CTI ablation with no prior history of typical atrial flutter may not have had conduction properties conducive to the initiation or maintenance of CTI-dependent atrial flutter. Performing empiric CTI ablation in such individuals may result in proarrhythmia due to conduction delay across the CTI from incomplete and nondurable ablation lines. It is possible that this effect may have been underestimated in the current study (6) due to the short follow-up period, lack of intensive rhythm monitoring during follow-up, and lack of a comparison group of patients who underwent PVI alone without empirical PVI + CTI.

Finally, these data (6) cannot be used to assess the overall durability of CTI ablation in either scenario. In analyzing a subset of patients with

arrhythmia recurrence (whether it be AF post-CTI ablation or AF post-CTI + PVI), we are missing the true denominator (all patients who underwent CTI ablation or CTI + PVI). The actual proportion of patients who have conduction recovery across the CTI line after an initial ablation is likely much lower than stated in this study. Given the limitations of the study, it is unlikely that we can draw accurate conclusions about the true prevalence of conduction recovery after a CTI ablation. However, the authors must be commended for shedding light on the high incidence of conduction recovery across the CTI at redo procedures. This highlights the importance of re-evaluating the durability of prior CTI ablation lines at the time of PVI. In addition, it supports the standard of care that empiric CTI ablation in patients undergoing PVI without prior typical atrial flutter or inducible typical flutter is not supported by evidence, and has a significant chance of reconnection.

When CTI ablation is indicated at the time of PVI, care must be taken to perform meticulous ablation to improve the chance of durable conduction block. To provide an opportunity to confirm persistent conduction block across the CTI, operators may also consider performing the CTI ablation before PVI and reassessing conduction across the CTI at the end of the procedure. The future development of novel, more effective ablation tools may also improve durability of linear ablation. We should follow the principle of “*primum non nocere*” and extreme methodological rigor when creating linear ablation lines, based on our past experience. Otherwise, we may just end up with another weak link across the CTI line.

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