Atrial fibrillation (AF) termination by ablation has been used as one of the catheter ablation endpoints for persistent AF.\textsuperscript{1-4} The literature regarding its validity are mixed because of heterogeneous study cohorts and ablation procedures; most of them included cases of both persistent AF and long-standing persistent AF. According to the 2012 HRS/EHRA/ECAS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation, persistent AF is defined as continuous AF that is sustained beyond 7 days. Episodes of AF in which a decision is made to electrically or pharmacologically cardiovert the patient after ≥48h of AF, but prior to 7 days, should be also classified as persistent AF. Longstanding persistent AF is defined as continuous AF >12 months duration. Continuous AF is AF that is documented to be present on all ECG monitoring performed during a defined period of time.\textsuperscript{5} It is known that as long as AF continues, atrial substrates become more complicated.\textsuperscript{6,7} Inevitably, long-standing persistent AF may require more complex ablation procedures than the merely “persistent” AF. Having these 2 categories together in the same study cohort will complicate and mislead the interpretation of the ablation outcome.
The heart rate during transesophageal echocardiography could be caused by spiral waves (rotors) or focal impulses, though the existence of such localized mechanisms has been questioned in human AF. Recently, Narayan et al. showed that human AF is maintained by a small number of localized sources (rotors or focal sources), which are conserved in a certain space over time. Elimination of these targets terminated persistent and paroxysmal AF, which also became noninducible. The following reports from that study group emphasized the importance of patient-specific AF mapping. Further studies with long-term follow-up are required, though ablation for persistent AF will shift from empirical to novel mapping-based approaches in the near future.

In this issue of the Journal, Kumagai et al. report on their retrospective examination of preprocedural predictors of AF termination by ablation in 70 patients with persistent or long-standing persistent AF who underwent initial radiofrequency catheter ablation. Between the patients with AF terminated by ablation (Group 1) and the patients with AF terminated by cardioversion after ablation (Group 2), the authors found that: (1) the left atrial appendage (LAA) contraction velocity was significantly decreased in Group 2 than in Group 1, (2) the AF-free survival rate was higher in Group 1 than in Group 2, (3) the LA reverse remodeling ratio at 3 months after ablation was greater in Group 1 than in Group 2, (4) the LAA contraction velocity was an independent predictor of AF termination by ablation, and LA diameter was the independent predictor of AF recurrence. There might be some comments regarding this study. First, persistent AF and long-standing persistent AF were not differentiated but included in the patient population. As mentioned, the arrhythmogenic substrates could differ. Second, the right atrium (RA) was not ablated, which overlooks the ARhythmogenicity of the RA. The patients in Group 1 could have had the arrhythmogenicity predominantly in the LA. Third, noninducibility after ablation was not confirmed. AF termination by ablation could be interpreted as modification or suppression of the AF maintenance mechanisms active at the time of ablation. To prove the complete elimination of AF maintenance mechanisms, noninducibility of AF is also necessary. Fourth, it has been suggested that LAA velocities are inadequate surrogates of global LA function in sinus rhythm. The relationship between LAA velocity and global LA function during AF is not clear yet. Fifth, the state of AF rate control is not described. High ventricular response rates during AF may be associated with further impairment of LAA flow. The heart rate during transesophageal echocardiography could have also affected the study result.

Setting these aspects aside, the authors should be congratulated for their vigorous effort in seeking an indicator for optimal patient selection in whom catheter ablation for persistent AF or long-standing persistent AF at the initial session might be effective. In conclusion, ideally, a procedural endpoint used for catheter ablation should be based on the presumed pathophysiological mechanism of the AF being treated. Appropriate selection of patient and ablation procedure, as well as careful endpoint planning, can enable a successful ablation outcome and therefore should be further investigated.

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