Left atrial dyssynchrony time measured by tissue Doppler imaging to predict atrial fibrillation recurrences after pulmonary vein isolation: Is this a mirage or the panacea?

Pulmonary vein (PV) isolation is considered key to atrial fibrillation (AF) treatment. To date, it has been an unsolved quest for ablation specialists (including cardiac electrophysiologists and cardiac surgeons) and researchers to be able to predict the likelihood of AF recurrence following an ablation procedure (1-3). Several predictors of AF recurrence after ablation have been identified, including age, AF type, duration of AF episodes, hypertension, and echocardiographic parameters, after cardioversion and catheter ablation (4-7). Indexed minimal left atrial (LA) volume (8), LA pressure (9), and LA mechanical dyssynchrony (10) are other factors that help to predict the success of AF ablation procedure. Several other non-invasive methods, including signal-averaged electrocardiogram (SAECG), have been used to predict the success or failure of PV ablation for AF (11-14). These studies have revealed varying results due to varying study designs and different definitions of recurrence.

The paper, in this issue published by Salah et al. (14) in Anatolian J Cardiol June 3, 2014, assessed the value of LA dyssynchrony time, measured by tissue Doppler imaging (TDI), to predict recurrences after PV isolation (PVI) in patients with paroxysmal and persistent AF. The authors consider LA dyssynchrony time, as measured by TDI, capable of providing a more accurate assessment of the presence and extent of LA remodeling than conventional echocardiographic parameters, in addition to be a cheaper option. Among 160 patients undergoing radiofrequency ablation, 50 of them had AF recurrence during a mean follow-up of 12±3 months. Transthoracic echocardiography was done in a control group of 40 normal subjects (31 males; mean age 57.1±8.2 years) without any history of AF, structural heart disease, hypertension, and diabetes to define normal values for total atrial conduction time and LA dyssynchrony time, measured by TDI. Larger LA dyssynchrony time (26.5±2.4 ms vs. 23.5±2.3 ms, $p<0.001$) was observed among patients with AF recurrence. Further, a LA dyssynchrony time of 25 ms had a positive predictive value of 53% and negative predictive value of 85.5% with the best combination of sensitivity and specificity (74% and 63%, respectively). Salah et al. (15) also identified LA dyssynchrony time (HR per ms: 1.69, $p<0.001$) as an independent predictor of AF recurrence, and if it was ≥25 ms, then patients were prone to AF recurrences during follow-up. P wave duration (PWD) for whole patient group (n=160) was 109.4±15.6 ms; the no recurrence subgroup (n=110) had a shorter PWD (103.2±13.7 ms). The recurrence subgroup (n=50) had a longer PWD (123.1±9.7 ms), with p value=0.001. Additionally, repeated ablation was done in 37 patients, among whom 10 patients had PV reconduction only. The last 27 patients with a large LA dyssynchrony time of 26.7±2.7 ms showed the presence of non-PV triggers as follows: 2 in the superior vena cava, 5 in the ligament of Marshall, 6 in the coronary sinus, and 14 in the LA posterior wall, 5 of whom were having also PV reconnection. Post-PV isolation, the concept of atrial reverse remodeling, is reinforced by the improvement of LA dyssynchrony time.

This study by Salah et al. (15) provides a further and important step in the prediction of AF recurrence after PV isolation. Previously, Evranos et al. (16) used LA electromechanical delay with a cut-off value of 29.5 ms as a predictor of AF recurrence after AF ablation. Their study differs in several parameters, such as a smaller population, different method for measuring the PA time interval by TDI, and finally, the follow-up. Supported by a very accurate echocardiographic investigation, the study by Salah et al. (15) contributes to the comprehensive interpretation of the results of a vast number of prior attempts to predict AF recurrence after PV isolation. However, in contrast to speckle tracking technology, Doppler methodology is angle-dependent and difficult for strain measurements (10). In this respect, this study also points out the need for analyzing to what extent the information provided by Doppler methodology can be used to predict recurrence of AF after PV isolation.

With regard to left atrial dyssynchrony time measured by tissue Doppler imaging to predict atrial fibrillation recurrences after pulmonary vein isolation, is this a mirage or the panacea? We are tempted to answer "wait and watch," and certainly not on the basis of the very limited worldwide experience with this approach. It seems obvious that more research is needed, including much larger, prospective, multicenter trials.

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