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Predictors of recurrence of paroxysmal atrial fibrillation following cryoablation based pulmonary vein isolation

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Cryoablation based pulmonary vein isolation (PVI) is a safe and effective method for treatment of paroxysmal atrial fibrillation (PAF). Recurrence after cryoablation for PAF is not uncommon [1,2], ranging from 25 to 50%. Celik [3] and coworkers have attempted to identify factors associated with recurrence of PAF after cryoablation of PVs. Recurrence of AF after successful PVI (using radiofrequency catheter ablation) is often due to PV reconnection [4], other factors include non PV triggers, and other focal mechanisms. There are conflicting results about the predictors of AF recurrence after cryoablation based PVI. Present report by Celik et al. [3] published in this issue of Indian Pacing and Electrophysiology Journal addresses this problem. They performed cryoablation based PVI in 50 patients with PAF and followed them for 12 months. Left atrial volume (LAV), left atrial volume index (LAVi), serum galactin-3 (Gal-3) level and neutrophil to lymphocyte ratio (N/L ratio) were measured before ablation and at 6 and 12 months of follow-up post ablation. Atrial fibrillation recurred in 14 patients and 36 were free of recurrence. Increased LAV and LAVi measured at baseline were associated with AF recurrence after cryoablation based PVI. However, markers such as Gal-3 and N/L ratio were not helpful to predict AF recurrence in this cohort.

If we are able to identify clinical predictors of AF recurrence after cryoablation, it will help us to avoid unnecessary procedures, and complications related to it. It will help patient selection and improve clinical outcome following cryoablation based PVI. Although cryoablation based PVI eliminates the triggers, the effect of atrial substrate is often overlooked. Till date, several predictors of outcome of AF ablation have been identified which includes: age, duration of AF, LA size, number of antiarrhythmic drugs used pre-ablation, early recurrence of AF post ablation and co-morbidities including: obesity, sleep apnoea, hypertension, LA fibrosis [5–8].

The mechanism of AF includes interplay between electrical, contractile and structural remodeling, which are important synergistic components of the AF substrate. Further, the role of metabolic

milieu which includes pro-inflammatory, and pro-oxidant environment in the development of AF recurrence after ablation therapy should not be overlooked. Factors related to ongoing inflammation and oxidative stress including: red cell distribution width (RDW), N/L ratio, HsCRP (high sensitivity C-reactive protein) have shown some association with AF [9–14]. In a study by Aksu et al., [15] patients with AF recurrence after cryoablation had higher baseline RDW which is a measure of size and variability of red blood cells (RBCs). It is an inexpensive and easily available marker of inflammation and oxidative stress in AF. Higher RDW quartiles are related with left atrial enlargement (LAE), which is known to be an indicator of advanced LA structural remodeling. We can't determine if LAE is the cause or effect of PAF and elevated plasma level of RDW. Thus, further studies are needed to establish exact pathophysiologic and prognostic role of RDW in AF.

Epicardial adipose tissue (EAT) thickness has also been found to be associated with AF recurrence after catheter ablation [16–18]. It has been shown that EAT contains numerous autonomic ganglionated plexi, which take part in initiation and continuation of AF [19]. As shown by Kocyigit et al. [20] total periatrial EAT measured with cardiac computed tomography is an independent predictor of AF recurrence in patients undergoing cryoablation. Canpolat et al. [21] investigated the association of transforming growth factor (TGF)- β 1 (a marker of atrial fibrosis) with the extent of LA fibrosis using delayed enhancement cardiac magnetic resonance imaging (DEMRI), and effects of LA fibrosis on the success of cryoablation for lone AF. Increase in LA fibrosis of >20% predicted AF recurrence after catheter ablation with a sensitivity of 100% and specificity of 93.75%. Plasma TGF- β 1 level >15,894 pg/mL predicted the presence of LA fibrosis with sensitivity of 70.37% and specificity of 100%.

Next in line are the autoantibodies, which may have a role in structural atrial remodelling [22]. Anti-M2-R (antimuscarinic acetylcholine receptor antibody) level is a marker of LA fibrosis detected by DE-MRI in paroxysmal lone AF patients. Gurses et al. [23] demonstrated elevated anti-M2-R levels in patients with late recurrence of AF following cryoablation. Thus, by predicting the severity of LA fibrosis in DE-MRI, anti-M2-R levels may improve patient selection for successful AF ablation, avoiding procedures in patients likely to have recurrence of AF. Yalcin et al., [24] determined the preprocedural predictive value of anti- β 1-R (autoantibody against β 1 adrenergic receptor) levels for AF recurrence. Elevated anti- β 1-R levels (>159 ng/mL) was an independent predictor of AF recurrence following cryoablation in this study.

Isolation of PVs with cryoablation addresses the triggers, but substrate for perpetuation of AF may continue to remain untreated and progress over time.

Conclusion: There is a potential role of inflammatory indices to

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predict recurrence of AF after cryoablation. Various indices like-RDW, autoantibodies and periatrial fat have been associated with recurrence of AF after cryoablation, but their causal relation is yet to be proven. More work is needed to understand about the predictors of recurrence of AF following cryoablation based PVI.

Disclosure

None to declare.

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