High incidence of left atrial dysfunction and low voltage zone in patients requiring multiple atrial fibrillation ablation

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Funding Acknowledgement: Type of funding source: None

Background: While multiple catheter ablation for recurrent atrial fibrillation (AF) is effective for the maintenance of sinus rhythm, some of patients have ablation-refractory AF. Left atrial (LA) dysfunction and the presence of low voltage zone (LVZ) are associated with recurrence after AF ablation. The association between recurrence and LA dysfunction/ LVZ among patients undergoing multiple AF ablation remains unclear.

Purpose: We aimed to compare (i)LA function, (ii)the prevalence of LVZ among patients undergoing first, second and third or more AF ablation procedures. Further, we investigated whether LA dysfunction and LVZ are associated with recurrence after multiple procedures.

Methods: We retrospectively analyzed 460 patients undergoing AF ablation procedures including first, second and third or more sessions from January 2017 to October 2019 in our institute. Before each session, 256-slice MDCT was performed under sinus rhythm to measure pre-ablation LA emptying fraction (LAEF) as the representative of LA function. At the end of each session, we checked the presence of LVZ, which was defined as regions where bipolar peak-to-peak voltage was $<$0.5mV. All patients underwent pulmonary vein isolation (PVI). If necessary, additional ablation (e.g. linear ablation, non-PV foci ablation and LVZ ablation) was performed.

Results: Out of 460 sessions, 295 were first (follow-up years: 1.5 [0.8, 2.0]), 134 were second (1.0 [0.5, 1.8]), and 31 were third or more sessions (1.2 [0.7, 2.0]). As the number of sessions increased, the recurrence rate was increased (19% vs. 31% vs. 61%, first vs. second vs. $\geq$third, P$<$0.0001), LAEF decreased (39.7±10.5% vs. 32.6±10.1% vs. 25.3±11.8%, P$<$0.0001) and the incidence of LVZ increased (18% vs. 34% vs. 68%, P$<$0.0001) (Figure 1). In patients with recurrence (N=104) after multiple ablation (second or more sessions), LAEF was lower and the prevalence of LVZ was higher than those without recurrence (N=61) (LAEF: 27.3±10.3% vs. 33.5±10.5%, with vs. without, P=0.0003; LVZ: 57% vs. 31%, P=0.0014).

Conclusions: As the number of sessions increased, the recurrence rate was increased. The prevalence of LA dysfunction and LVZ was high in patients requiring multiple ablation procedure. LA dysfunction and LVZ possibly reflect arrhytmogenic substrate causing recurrence of ablation-refractory AF. We should carefully consider repeated AF ablation in patients with severe LA dysfunction and extensive LVZ.

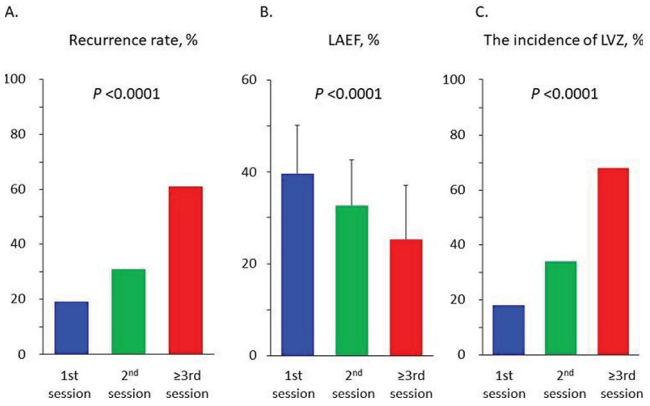

Figure 1