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New minimally invasive and tailor-made strategy for cryoballoon ablation in patients with paroxysmal atrial fibrillation

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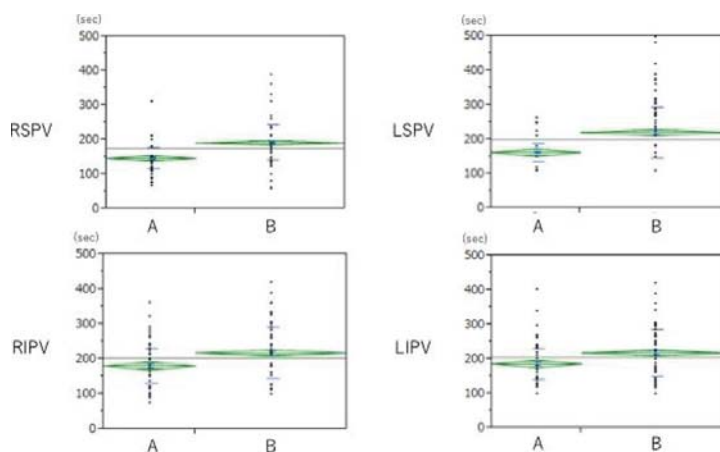
Background: Currently, cryoballoon ablation (CBA) has proven to be highly effective in achieving free from atrial fibrillation (AF), especially paroxysmal AF. However, the optimal freezing protocol for each patient to achieve successful pulmonary vein isolation by only CBA is still uncertain. The aim of this study was to evaluate the clinical implications of a reduction in the freezing duration (<180s) during CBA guided by the time to target temperature.

Methods: From November 2015 to August 2018, 286 consecutive paroxysmal AF patients undergoing CBA were enrolled. We compared 107 patients undergoing a tailor-made CBA procedure (Group A; August 2017-August 2018) to 179 patients with a standard CBA procedure (Group B; November 2015-July 2017). In Group A, the freezing duration was reduced to 150s when the temperature reached $\leq -40^{\circ}\text{C}$ within 40s. Furthermore, we reduced it to 120s when it reached $\leq -50^{\circ}\text{C}$ within 60s. In the other patients, the freezing time was 180s except for excessive freezing over -60°C and/or emergent situations while monitoring the esophageal temperature and for phrenic nerve injury as in Group B.

Results: The baseline clinical characteristics were similar between two

groups. In Group A, 89 patients (83%) underwent CBA with a reduction in the freezing time. The rate of having reduction time in left inferior PV (LIPV) and right inferior PV (RIPV) was lower compared with left superior PV (LSPV) and right superior PV (RSPV) (respectively 17%, 29%, 56%, and 63.5%). However, for right inferior PV, in 31 patients having the reduced freezing time, none of them required touch-up ablation. Although the procedure time and frequency of touch-up ablation did not differ between the 2 groups, total freezing time for each PV was significantly shorter in Group A than Group B as shown in figure (LSPV: $164 \pm 28\text{s}$ vs. $216 \pm 67\text{s}$; $p < 0.001$, LIPV: $187 \pm 44\text{s}$ vs. $218 \pm 69\text{s}$; $p < 0.001$, RSPV: $147 \pm 31\text{s}$ vs. $192 \pm 51\text{s}$; $p < 0.001$, RIPV: $180 \pm 50\text{s}$ vs. $218 \pm 73\text{s}$; $p < 0.001$). The AF free survival rate during the follow-up period (356 ± 167 days) was similar between the 2 groups (log-rank test, $p = 0.38$). Furthermore, the complication rate was similar 2 groups.

Conclusion: The safety and efficacy of the new tailor-made CBA strategy were non-inferior to the standard procedure. This study showed that the unnecessary freezing time could be reduced in most of paroxysmal AF patients.



The freezing time for each PV