Changes in luminal esophageal temperature during pulmonary vein isolation by High-Power versus Conventional radio-frequency ablation

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Introduction: Power setting of radiofrequency application has been known to influence the lesion characteristics and safety issues. The Ablation Index (AI) which is calculated by power, contact force and delivery time would be expected to intensify the efficacy and safety even in the any power setting. However, there are few studies about the impact of high-power setting based on AI for esophageal temperature during pulmonary vein (PV) isolation.

Methods: Consecutive 152 patients underwent their initial PV isolation for atrial fibrillation (AF) using radio-frequency ablation based on AI from July 2017 to April 2019 were enrolled. The early 72 patients were allocated to the conventional ablation group (Conventional), and the later 80 patients were to the high-power ablation group (High-Power). Each application was controlled by AI up to 550 for anterior and roof of PV with 35 or 50w, 400-500 for posterior with 25 or 40w in Conventional or High-Power, respectively. A 7-pole temperature sensor probe was placed into the esophagus and the upper limit of application delivery was set 41 °C. The duration of high temperature exposure of each sensor in the esophagus was evaluated. Three steps of 37.8 °C, 39.0 °C, and 41 °C were set as the high temperature cutoff.

Result: The mean age was 69±9 years old. Sixty-eight percent of the study patients were men, and BMI was 23.5±4.2. Baseline esophageal temperature was slightly higher in High-Power than Conventional (36.2 ± 0.1 vs 35.9 ± 0.1 °C, p = 0.03). There were no differences in the maximum temperature (42.6 ± 0.2 vs 42.3 ± 0.2 °C., p = 0.39) and the duration over 41 °C (56 ± 7 vs 56 ± 7 seconds, p = 0.96). The duration over 39 °C (396 ± 54 vs 566 ± 57 seconds, p = 0.03), the duration over 37.8 °C (1900 ± 337 vs 2787 ± 356 seconds, p = 0.04) were significantly shorter in High-Power. There was no significant difference in the temperature elevation rate to reach the maximum temperature (0.33 ± 0.04 vs 0.26 ± 0.04 °C/sec, p = 0.13).

Conclusion: High-Power radio-frequency ablation based on AI could be performed safely compared with Conventional ablation.