Changes of QT interval in the acute phase after pulmonary vein isolation for paroxysmal atrial fibrillation

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Introduction: Pulmonary vein isolation (PVI) affects ganglionated plexi (GP) around the atrium, leading to a modification of the intrinsic cardiac autonomic system (ANS). In animal models, GP ablation has a potential risk of QT prolongation and ventricular arrhythmias. However, the impact of PVI on QT intervals in humans remains unclear.

Purpose: This study aims to evaluate the Impact of PVI on QT interval in patients with paroxysmal atrial fibrillation.

Methods: We analyzed consecutive 117 PAF patients for their first PVI procedures. 12-lead ECG was evaluated at baseline, 4 hr, day 1, 1 month, and 3 months after ablation. Only patients with sinus rhythm on 12-lead ECG at each evaluation point without antiarrhythmic drugs were included.

Results: Heart rate significantly increased at 4 hr, day 1, and 1 month. Raw QT interval prolonged at 4 hr (417.1±41.6 ms, $P<0.001$) but shortened at day 1 (376.4±34.1 ms, $P<0.001$), 1 month (382.2±31.5 ms, $P<0.001$), and 3 months (385.1±32.8 ms, $P<0.001$) compared to baseline (391.6±31.4 ms). Bazett- and Fridericia- corrected QTc intervals significantly prolonged at 4hr (Bazett: 430.8±27.9 ms, $P<0.001$; Fridericia: 425.8±27.4 ms, $P<0.001$), day1 (Bazett: 434.8±22.3 ms, $P<0.001$; Fridericia: 414.1±23.7 ms, $P<0.001$), 1M (Bazett: 434.8±22.3 ms, $P<0.001$; Fridericia: 408.2±21.0 ms, $P<0.05$), and 3M (Bazett: 420.1±21.8 ms, $P<0.001$; Fridericia: 407.8±21.1 ms, $P<0.05$) compared to baseline (Bazett: 404.9±25.2 ms; Fridericia: 400.0±22.6 ms). On the other hand, Framingham- and Hodges- corrected QTc interval significantly prolonged only at 4hr (Framingham: 424.1±26.6 ms, $P<0.001$; Hodges: 426.8±28.4 ms, $P<0.001$) and at day1 (Framingham: 412.3±29.3 ms, $P<0.01$; Hodges: 410.6±40.2 ms, $P<0.05$) compared to baseline (Framingham: 399.2±22.7 ms; Hodges: 400.7±22.8 ms). At 4 hr after ablation, raw QT and QTc of all formulas significantly prolonged than baseline. Raw QT and QTc prolongation at 4hr after ablation were more frequently observed in female patients. Multiple regression analysis revealed that female patient is a significant predictor of raw QT and QTc interval prolongation of all formulas 4hr after PVI.

Conclusions: Raw QT and QTc prolonged after PVI, especially in the acute phase. Female patient is a risk factor for QT prolongation in the acute phase after PVI.