Post-procedural plasma brain natriuretic peptide level early after catheter ablation predicts the future clinical outcome in patients with persistent atrial fibrillation and reduced ejection fraction

Masato Okada
Koji Tanaka
Toshinari Onishi
Takafumi Oka
Yuko Hirao
Nobuaki Tanaka
Issei Yoshimoto
Ryo Kitagaki
Yasushi Koyama
Atsunori Okamura
Katsuomi Iwakura
Kenshi Fujii
Koichi Inoue

Introduction: Successful restoration of sinus rhythm (SR) by catheter ablation (CA) for persistent atrial fibrillation (AF) improves cardiac function, resulting in decrease of plasma brain natriuretic peptide (BNP) level. The exact significance and prognostic implications of this change have yet to be determined. The purpose of this study was to examine the impact of pre- and post-procedural BNP level on the clinical outcome after CA in patients with persistent AF and reduced left ventricular ejection fraction (LVEF).

Methods: Out of 242 patients with LVEF <50% who underwent first-time CA for persistent AF between March 2012 and September 2018 at our institute, we enrolled 137 patients (61 ± 10 years, 83% male) whose plasma BNP level was available both at baseline and early after CA (during 1-3 month). We evaluated the impact of the BNP levels on future AF recurrence 3 months after CA as the primary endpoint. Additional secondary endpoints included heart failure (HF) hospitalization and cardiovascular death.

Result: All patients successfully restored SR at the end of CA. Within 3 months of a blanking period (BP), improvement of LVEF (from 39 ± 10% to 65 ± 12%, p <0.001) and reduction of BNP levels (from 178 [107-332] pg/ml to 42.3 [21.1-78.6] pg/ml, p <0.001) were observed. During the median follow-up of 21 months after BP, the incidence of AF recurrence, HF hospitalization, and cardiovascular death was 37% (n = 50), 3% (n = 4), and 1% (n = 1), respectively. Cox proportional hazard regression analysis after adjustment for age and gender revealed that post-procedural BNP level was a significant predictor of the AF recurrence (hazard ratio [HR] per 100-pg/ml increase, 1.13; 95% confidence interval [CI], 1.02-1.25; p = 0.023), but pre-procedural BNP level was not (1.02; 0.95-1.09; p = 0.56). Receiver operating curve analysis determined the post-procedural BNP level of 55.5 pg/ml as the best cut-off value for predicting the AF recurrence, with area under the curve of 0.620 (95%CI, 0.534-0.702; p = 0.018). The incidence of AF recurrence was significantly higher in patients with post-procedural BNP level >55.5 pg/ml (n = 50) than the others (50% vs. 29%; HR, 3.99; 95% CI, 2.07-7.68; p <0.001). No patients with post-
procedural BNP level ≤55.5 pg/ml experienced HF hospitalization and cardiovascular death (8% vs. 0% and 2% vs. 0%, \( p = 0.006 \) and \( p = 0.17 \), respectively).

**Conclusion:** Not pre-procedural but post-procedural BNP level early after CA predicted the future clinical outcome in patients with persistent AF and reduced LVEF. Decreased but still elevated BNP level after restoration of SR would identify the residual risk for developing unfavorable outcome.