Incidence of silent thromboembolism during catheter ablation of atrial fibrillation among 4 types of ablation devices

Michifumi Tokuda
Seigo Yamashita
Seiichiro Matsuo
Hidenori Sato
Eri Okajima
Hirotugu Ikewaki
Hirotusa Oseto
Masaaki Yokoyama
Ryota Isogai
Kenichi Tokutake
Kenichi Yokoyama
Ryosuke Narui
Mika Kato
Shin-ichi Tanigawa
Michihiro Yoshimura
Teiichi Yamane

Introduction: Even symptomatic cerebral thromboembolism (CE) occurred during radiofrequency catheter ablation for atrial fibrillation (AF) is rare, an asymptomatic CE which was sometimes detected by postprocedural MRI. Recently, cryoballoon, hot balloon, laser balloon had been developed for pulmonary vein isolation of paroxysmal AF. The purpose of this study was to evaluate the incidence and the risk factor of CE among radiofrequency catheter and 3 types of balloon catheter.

Methods: A total of 717 patients who underwent the initial catheter ablation for paroxysmal AF were included. Pulmonary veins were isolated using RF catheter, cryoballoon, hot balloon, laser balloon in 362, 296, 33 and 26 patients, respectively. Cerebral MRI was performed one or two days after the procedure in all patients. The presence of CE was evaluated by the radiologist who is blinded to the study.

Result: Peri-procedural CE was detected in 25.6% of patients by postprocedural MRI. Only one patient after cryoballoon ablation had complained of mild left-hand muscle weakness and was diagnosed as symptomatic stroke. In patients with CE, age was older (60.2 ± 9.9 vs. 57.2 ± 10.1yrs, P=0.001), left atrial diameter was larger (38.0 ± 5.9 vs. 36.8 ± 3.0 mm P=0.01), serum BNP level was higher (61.9 ± 69.1 vs. 47.9 ± 68.0 pg/ml, P=0.02) and hypertension were more frequently observed (48% vs. 36%, P=0.002) than those without. Both CHADS2 and CHA2DS2 VASc score were higher in the patients with CE than those without (0.8 ± 0.9 v. 0.6 ± 0.9 and 1.4 ± 1.3 vs. 1.1 ± 1.1, respectively). Among 4 types of ablation devices, incidences of CE were higher in laser balloon ablation than either RF or cryoballoon ablation (Figure). After propensity score matching between each two groups, incidence of CE was higher in laser balloon ablation than cryoballoon ablation (50% vs. 15%, P=0.008) and tend to be higher in laser balloon ablation than RF catheter ablation (51% vs. 26%, P=0.07).

Conclusion: After the catheter ablation of paroxysmal atrial fibrillation, peri-procedural silent CE is
detected in 25.6% of the patients by MRI. Laser balloon ablation has a higher risk of asymptomatic procedural cerebral embolism than either RF or cryoballoon ablation.