

## Editorial



# Non-fluoroscopic Catheter Tracking System for Atrial Fibrillation Ablation

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### Conflict of Interest

The author has no financial conflicts of interest.

The contents of the report are the author's own views and do not necessarily reflect the views of the *Korean Circulation Journal*.

► See the article "The Accuracy and Clinical Applicability of a Sensor Based Electromagnetic Non-fluoroscopic Catheter Tracking System" in volume 49 on page 84.

Catheter ablation is a standard of care in symptomatic atrial fibrillation (AF) refractory or intolerant to antiarrhythmic drug therapy.<sup>1)</sup> Pulmonary vein (PV) isolation using a radiofrequency energy or cryoenergy is a cornerstone of AF ablation irrespective of type of AF. Catheter ablation in complex structure such as the left atrium (LA) has inherent risk of cardiac tamponade, PV stenosis. Besides cardiac complication related to catheter itself, catheter ablation of AF has adverse effects to organs and structures adjacent to LA or target of catheter ablation of AF such as atriopharyngeal fistula, right phrenic paralysis, injury to vagal plexus leading to gastroparesis, etc.

Complex ablation procedure has been simpler and faster by virtue of 3-dimensional (3D) electroanatomic mapping system which can merge on-time mapping data with computed tomography (CT) scan or magnetic resonance imaging (MRI) of the heart.<sup>2)</sup>

Though operator can perform ablation procedure with assistance of mapping system and imaging, main imaging modality for AF is still a fluoroscopy. Considering small errors in merging process can lead to erroneous ablation either inside or outside of the pulmonary antrum, many operators still relies on pulmonary venography or fluoroscopic imaging. Fluoroscopy has many advantages such as early detection of cardiac tamponade as well as absolute guide to positioning catheters in the coronary sinus, right atrium and right ventricle. However, prolonged use of fluoroscopy has serious side effects such as carcinogenic effect and radiation dermatitis of the patients.<sup>3)</sup>

Intracardiac echocardiography, magnetic and robotic catheter navigation and MediGuide™ system (St. Jude Medical, Minnetonka, MN, USA) are currently used in many electrophysiologic laboratories to decrease radiation exposure to patients and medical staffs and improve safety of the procedure and outcomes of AF ablation. Recently introduced MediGuide™ technology for visualization of catheter has following features. Single-coil sensors embedded in the catheter tip can be accurately localized by an electromagnetic field. Information about the 3D position and orientation of the tools is then transferred to the fluoroscopy system and is used to visualize the catheter tip in a virtual biplanar view projected on 2 prerecorded cine-loops.<sup>4)5)</sup> It has been previously shown that the application of the MediGuide™ technology can lead to a significant reduction in fluoroscopy burden by using diagnostic catheters in atrial flutter<sup>6)</sup> and AF.<sup>7)</sup>

In a recent article in *Korean Circulation Journal*, Yamada et al.<sup>8)</sup> investigated the anatomical accuracy between electromagnetic- (EM; MediGuide™, St. Jude Medical) and impedance (IM; EnSite Velocity™, St. Jude Medical)-based mapping systems. In their prospective study, Yamada et al.<sup>8)</sup> reported that the actual and relative changes of EM and CT-based geometry in all PV angles and posterior LA surface area were significantly smaller compared to those of IM and CT-based geometry. In addition, intraclass correlation coefficient (ICC) between EM and CT-based geometry were higher compared with ICC between IM and CT-based geometry across all 4 PVs. Although data from first consecutive 15 patients who underwent AF ablation using EM based geometry was analyzed compared with control patients, there were significant reduction of fluoroscopy time during PV isolation and cavotricuspid isthmus ablation. In addition to well-established effect of MediGuide™ system in reducing fluoroscopy duration in complex AF ablation, they demonstrated that geometry created by using EM mapping system is more accurate than geometry by IM-based mapping system, which deserves renewed interest in MediGuide™ system among interventional electrophysiologists caring for AF patients.

In conclusion, to decrease complications and increase efficacy of AF ablation procedure; 1) pre-procedural imaging study, preferably using MRI to avoid radiation hazard and to detect atrial substrate abnormality, 2) intracardiac echocardiography to detect early complication and to create real-time 3D cardiac anatomy, 3) fluoroscopy with reduced radiation exposure mode, and 4) electroanatomic mapping system using magnetic field rather than IM-based mapping for accurate creation of chamber of interest are needed. MediGuide™ system will be helpful especially in electrophysiology laboratory where only IM-based mapping systems are available or intracardiac echocardiography is unavailable.

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