European early experience with a novel 3D mapping system

Deisenhofer I.[1]; Lengauer S.[1]; Telishevska M.[1]; Richter S.[2]; Rajappan K.[3]; Kottmaier M.[1]; Bertagnolli L.[2]; Moreno J.[4]; Hunter R.[5]; Tao C.[6]; Della Bella P.[7]

[1]German Heart Centre Munich, Munich, Germany
[2]Heart Center - University of Leipzig, Leipzig, Germany
[3]Oxford University Hospitals NHS Foundation Trust, Oxford, United Kingdom of Great Britain & Northern Ireland
[4]Hospital Ramón y Cajal, Madrid, Spain
[5]St Bartholomew"s Hospital, London, United Kingdom of Great Britain & Northern Ireland
[6]Abbott, Minneapolis, United States of America
[7]IRCCS San Raffaele Scientific Institute, Milan, Italy

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Introduction: Catheter navigation and 3-dimensional (3D) cardiac mapping are critical for successful electrophysiological ablation procedures. A novel 3D mapping system received CE Mark in July 2020. The system offers two imaging modalities: magnetic-based (VoXel) and impedance-based (NavX). Real-time display of 3D location and catheter movements is achieved via a magnetic field frame and magnetic sensors with supplemental impedance data when operating in VoXel mode or primarily via an impedance field generated from surface electrodes in NavX mode. To address limitations in data collection commonly experienced during 3D mapping, a new respiratory compensation algorithm, patient movement detection module, and metal compensation algorithm have been developed to enable consistent data collection throughout the full respiratory cycle even in challenging cases and lab environments.

Purpose: To examine the clinical utility and procedural characteristics associated with the use of this novel 3D mapping system among participating centers.

Methods: Procedural data was collected in cases utilizing the newly cleared mapping system during the initial evaluation phase in Europe. Procedural characteristics recorded included indication for mapping and ablation, rhythm mapped, chambers mapped, and procedure time.

Results: Procedural data was collected from over 250 cases across 12 European centers. A total of 12 indications for mapping and ablation were represented including de novo and redo atrial fibrillation (paroxysmal, persistent, long-standing persistent), ventricular tachycardia (ischemic, non-ischemic) or premature ventricular contraction, and supraventricular arrhythmias (typical and atypical atrial flutter, atrioventricular nodal reentrant tachycardia, atrioventricular reentrant tachycardia). Over 70% of the cases were performed in VoXel mode. Impedance mode was mostly used in SVT cases or when the case was intended to be completed with minimal fluoroscopy. The most commonly mapped rhythms were sinus rhythm during voltage mapping and atrial tachycardia. The majority of cases (over 65%) were completed under conscious sedation; general anesthesia was used in 20% of the cases (15% not reported). The respiratory compensation algorithm was utilized in over 90% of the cases. For cases in which pre-procedural computed tomography or magnetic resonance imaging were available, operators indicated that the model shape was accurate when compared to pre-procedural imaging in 96% of the cases performed in VoXel mode.

Conclusions: Initial European experience with this novel 3D mapping system included a wide variety of arrhythmias in the atria and ventricles. This new mapping system offered operators the flexibility to tailor to specific procedure needs with two imaging modalities which were both widely utilized.