The Application of Novel Segmentation Software to Create Left Atrial Geometry for Atrial Fibrillation Ablation: The Implication of Spatial Resolution

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Introduction: The application of the new imaging software, CARTO® Segmentation Module on left atrium (LA) geometry for atrial fibrillation (AF) ablation, has not been well investigated.

Methods: Twenty-seven patients undergoing AF ablation using the CARTO system was studied (phase I). High-density LA mapping using PentaRay was merged with CT-based geometry from the auto-segmentation module. The spatial distortion between the two LA geometries was analyzed and compared by Registration Match View. (Figure 1 & 2). The associated contact force on the two LA shells was prospectively validated in 16 AF patients (phase II).

Result: Of the 5 LA regions, the roof area had the highest quality score between the 2 LA shells (1.7 ±0.6). In addition, among the pulmonary veins (PVs), the higher quality score was observed in bilateral PV carinas (both are 1.8 ±0.1). (Figure 3) It means that these areas had the highest spatial distortion. Furthermore, there is a significantly higher contact force surrounding the PV ostium for the on-surface points when targeting the high-density fast anatomical mapping (FAM) shell than those by the auto-segmentation module (RSPV, 20.7 ±5.8 vs 12.5 ±4.4; RIPV, 19.3 ±6.8 vs 11.8 ±4.8; LSPV, 22.5 ±7.3 vs 11.2 ±4.5; LIPV, 15.7 ±6.9 vs 9.7 ±4.4, P<0.05 to each group). (Figure 4)

Conclusion: The CARTO® Segmentation Module and Registration Match View provide better anatomic accuracy and less regional distortion of the LA geometry which can prevent over contact and potential complications.