UTILITY OF NEWLY AVAILABLE CARTO3 MAPPING SYSTEM TO GUIDE CATHETER ABLATION OF ATRIAL FIBRILLATION

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1. PURPOSE
Electro-anatomical mapping systems are widely used to guide radiofrequency catheter ablation (RFCA) of atrial fibrillation (AF). The new Carto3 mapping system allows diagnostic catheter visualization and a new volumetric 3D reconstruction of the cardiac chambers: the fast anatomical mapping (FAM). The aim of the study was to test the utility of the Carto3 system to guide RFCA of AF and to compare the accuracy of left atrial FAM with the cardiac magnetic resonance imaging (MRI).

2. METHODS
Twenty-five patients (mean age 58±12, 16 males) were referred to our lab for RFCA of highly symptomatic drug-resistant AF (≥2 AAD). All patients (12 paroxysmal AF, 13 persistent AF) underwent to left atrial ablation with encircling/de-connection of pulmonary veins (PVs), using Carto-Lasso technique.
PVs isolation was completed and then validated by a circular mapping catheter visualized on CARTO3 system. In patients with persistent AF, complex fractionated atrial electrograms maps were built upon the FAM reconstruction of the left atrium and ablation was performed.
During the FAM, the system set the mapping catheter motion to stable by averaging the catheter location over a one second period. Volume data were recorded continuously based on the position of the location sensor embedded in the mapping catheter.

A post-procedural qualitative and quantitative comparison between the FAM and the MRI of the left atrium was performed. The qualitative comparison included number/position of PVs. The quantitative analysis was performed by integration of the surface of FAM and MRI image and by evaluation of the registration accuracy.

3. RESULTS
One hundred PVs were reconstructed with FAM and acute successful isolation of PVs was 96% (Figure 1).

Mean procedure and fluoroscopy times were 141±59 and 31±16 min, respectively. No complication occurred. Mean mapping and fluoroscopy times during FAM were 9±3 min and 5±2, respectively.
A 100% match with MRI was found in terms of number and position of PVs and atrial anatomical areas (Figure 2). MRI integration resulted in a mean distance between the MR images and fast anatomical maps of 3.46±0.2 mm.

4. CONCLUSIONS
The new Carto3 mapping system revealed to be a useful tool to guide RFCA of AF, allowing an accurate MRI-like reconstruction of the left atrium and PVs.

Figure 1: Ablation Procedure
Left superior pulmonary veins potentials (white arrows) before (A) and after (B) disconnection. Lasso catheter was visualized on FAM.

Figure 2: Fast Anatomical Mapping of the Left Atrium: offline comparison with Magnetic Resonance image
A: orange volume data collected during manipulation of the mapping catheter inside the LA. B: surface reconstruction interpolated by the software from the outer surface of the orange volume data; C: qualitative comparison between FAM and MR image (yellow) in PA and LAO view; D: integration between FAM and MR image (yellow) performed by using CartoMerge software in PA and LAO view.

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