Reentrant Activity Detection during Atrial Fibrillation in Activation-based 2D Mapping Agrees with Phase-based 3D Mapping

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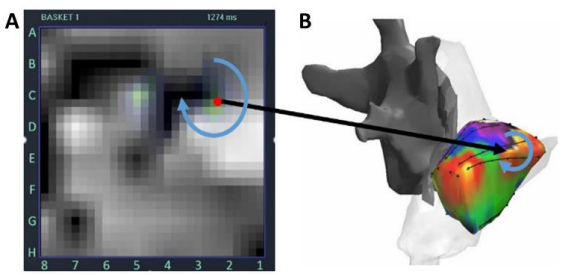
Reentrant patterns in atrial electrical activity may be drivers of atrial fibrillation (AF), yet their presence in different mapping techniques is highly variable. This abstract study the implications of bidimensional (2D) mapping excluding the electrode position versus 3D mapping considering electro-anatomic realistic geometries.

Electrograms of 30 patients with AF (45% persistent) was registered in both atria with 64-poles basket catheters during AF episodes. Reentries were identified by a commercial 2D-based activation+phase mapping (FIRM, Abott) and by a 3D-based mapping algorithm based in phase transform using open-software (Kuklik et al.). Presence of rotational activity was automatically classified based on phase singularity identification and compared between both methodologies.

Rotational presence was detected in 4.0±2.8 sites per patient in 2D activation maps vs 2.6±3.4 sites in 3D. Sources detected with 2D mapped were detected also by 3D mapping in 76±29 % of the cases, whereas 3D map revealed only 11±10 % of time sources in regions others than 2D detected reentries. In cases in which 2D and 3D did not agree, it was due to bad electrode location: in 41% of cases the distance between the basket splines was higher than 2cm, in 30% of cases more than 3 splines were too close (< 0.5cm), and in 12% of cases the electrode had probably bad electrical contact (>1cm from atrial wall).

Reentrant source identification in AF recordings may be carried out by 2D activation-based and 3D phase-based techniques. 3D anatomical electrode distribution may help to reconcile differences between both techniques.



A: 2D mapping using activation + phase analysis in a AF patient.
Red dot: reentrant site detected

B: 3D mapping using phase analysis in a realistic geometry for same example in (A). Reentrant patternt detected in (A) is shown as a phase singularity