MRI-based inverse potential mapping of premature ventricular contractions

- Proof of concept -

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LA

Disclosures

None

Background

- **Inverse potential mapping (IPM)**
  - clinically useful tool to map ventricular arrhythmias
  - facilitates catheter ablation

- **Pre-procedural body surface mapping (BSM)**
  - increases localization accuracy
  - reduces procedural time compared to standard of care (activation and pace mapping)[1]

- **The required CT scan**
  - increases radiation exposure compared to the traditional approach[1]

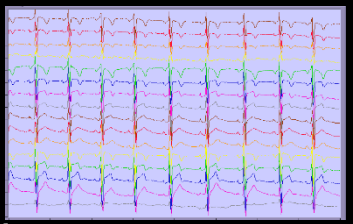
1. Erkapic D et al, Europace, 2014

Objective

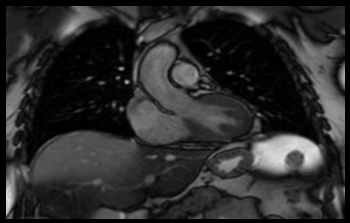
To evaluate the **accuracy of** a **MRI-based BSM** solution **in comparison to** the current gold-standard (**invasive activation mapping**) for localizing outflow tract PVC's

Methods –IPM and MRI

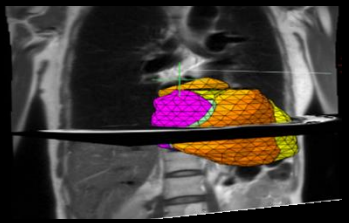
Step 1
Acquire BSP



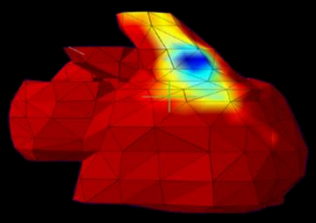
Step 2
Acquire geometry



Step 3
Segmentation

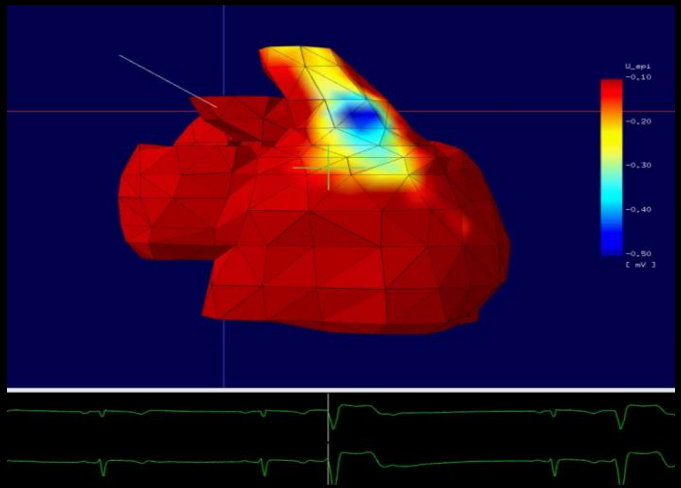


Step 4
IPM reconstruction

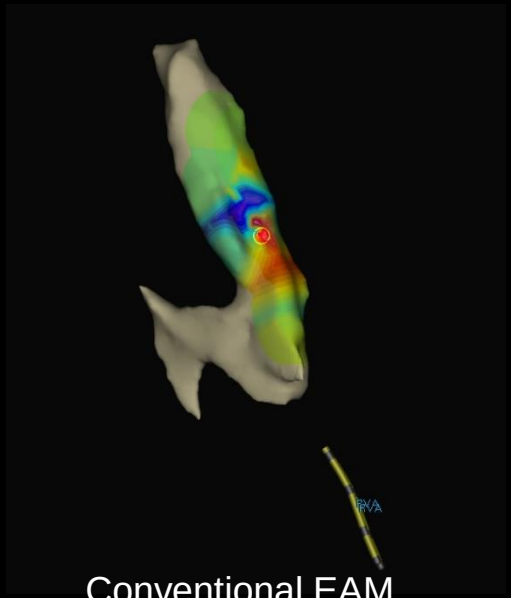


Non-invasive work-up

Results – RVOT PVC



MRI-based IPM



Conventional EAM

Focus identification on IPM and conventional EAM
Computing distance between the two 3-D coordinates

Results – ICC

Case	PVC focus IPM	Ablation site	Observer 1 (mm)	Observer 2 (mm)	ICC
1	NCC-LCC junction	LCC	9,3	7,7	**ICC = 0.812 p=0.004**
2	RVOT-Septal	RVOT-Septal	9,1	10,5	
3	RVOT-Anterior proximal	RVOT-Anterior proximal	6,4	5,2	
4	RVOT-Anterior	RVOT-Anterior	12,1	9,7	
5	RVOT-Septal proximal	RVOT-Septal proximal	7,6	10,3	
6	RVOT-Antero-septal	RVOT-Septal	11,7	11,4	
7	RVOT-Septal	RVOT-Septal	3,6	2,6	
8	NCC	NCC	6,4	8	
Mean			**8.3±2.7**	**8.2±2.8**	

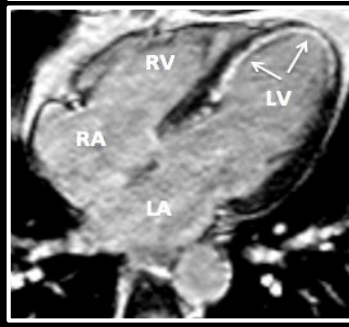
Bhagirath et al, Circulation AE, 2015

Conclusion

The proposed **MRI-based** IPM method

- is accurate for non-invasive PVC localization
- provides a radiation-free alternative for the currently available BSM approach

Clinical perspective

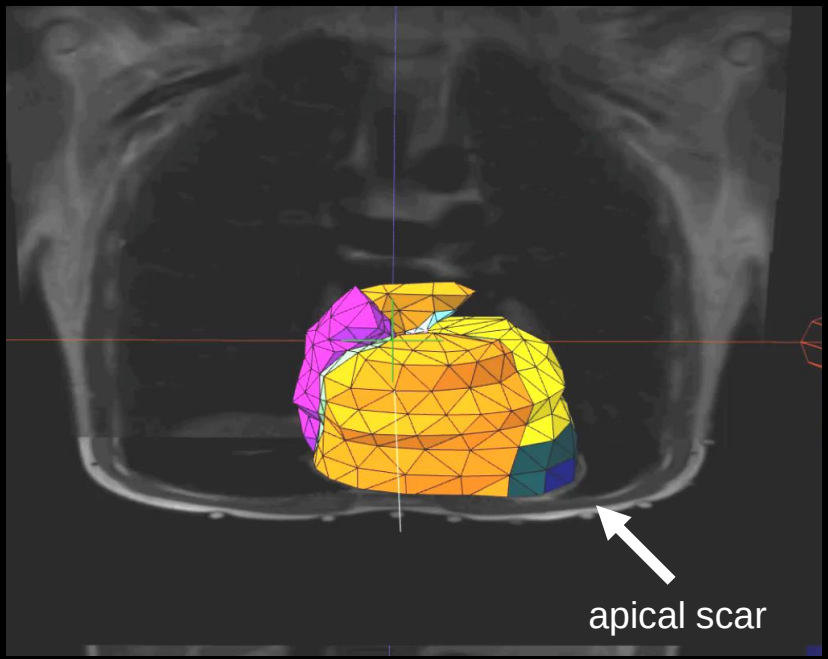


In addition to anatomy, **MRI** offers

- **Functional (hemodynamic) assessment**
- **Evaluation of tissue characteristics**

These properties facilitate the study of **electrical activation** in relation to **tissue characteristics**

Clinical perspective



Research Team

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