Utility of In-silico Pace Mapping to Successfully Identify Simulated Ventricular Tachycardia Exit Sites Non-Invasively Using both 12-lead ECG Recordings and Electrograms from Implanted Devices

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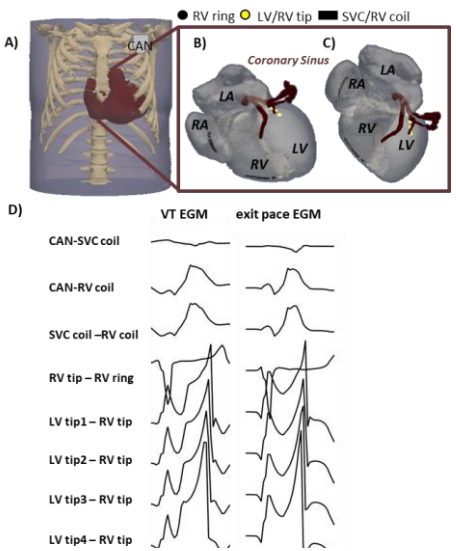
Pace-mapping is a time-consuming and invasive procedure for localizing optimal ablation sites – exit sites or isthmuses, requiring an existing ventricular tachycardia (VT)-ECG recording. Patient-specific computational models have the potential to perform non-invasive pace-maps to be used in pre-procedural planning with the ability to explore alternative (existing) VT signals (e.g. implanted devices electrograms - EGMs), different pacing protocol (epicardial, endocardial, transmural), and test recently proposed techniques (e.g. reference-less pace mapping). Using a 3D computational torso model (**A)** we simulated six different monomorphic VT episodes in the presence of three different infarct anatomies and performed in-silico pace-mapping. VT exit sites were successfully localized by comparing paced QRS complexes and simulated VT QRSs, and EGMs (**B**) from an implanted device (**C** and **D**). In addition, we performed reference-less pace-mapping, which compares QRSs and EGMs between different pacing locations, returning useful information on isthmuses. Finally, we saw a decrease in accuracy of performance of EGM pace mapping during epicardial pacing, due to the prevalence of endocardial sensing leads.



A; 3D torso model, **B**; and **C**; implanted device leads, **D**; VT EGMs and exit site EGM.

In conclusion, our study showed the possibility of substituting ECG pace mapping with EGM pace-mapping, which allows quicker pre-planning, as VT induction is not required, and more accurate ablation procedures, avoiding the mismatch between EP-induced and clinical VTs.