Ablation of ventricular tachycardia in patients with severe left ventricular dysfunction and frequent appropriate ICD shocks: potential benefits of arrhythmogenic substrate modification

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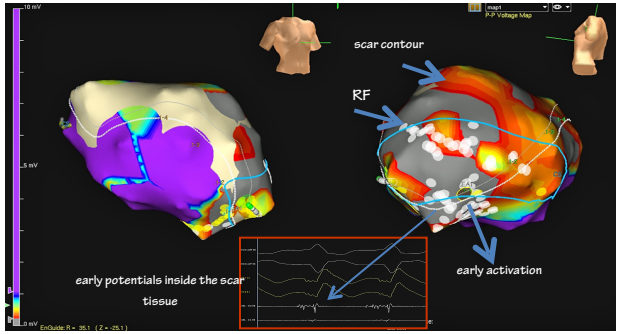
Purpose

In patients (P) with structural heart disease (SHD), recurrent ventricular tachycardia (VT) episodes worsens the clinical condition with a negative impact in prognosis. Treatment of these arrhythmias via ablation of VT circuits represents a difficult challenge, mainly due to the induction of intolerable VTs, with multiple ECG morphologies, requiring rapid shock delivery. An ablation strategy focused on the modification of the arrhythmogenic substrate has been suggested as an innovative promising approach.

Aim: to analyze results of a substrate-based ablation in SHD P with an implantable cardioverter-defibrillator (ICD) and recurrent appropriate shocks.



Methods

• 17 men (ischemic cardiomyopathy 83%, 65±13 yrs, LVEF 27±7% with recurrent episodes of VT and/or arrhythmic storms despite antiarrhythmic drug therapy and optimal heart failure medication.

EPS/mapping - ventricular programmed stimulation (600 ms/S3) to obtain baseline VT documentation and confirm hemodynamic intolerance/inability to map the VT. A sinus rhythm (SR) voltage map was created using a 3D electroanatomic mapping system (Ensite NavX/CARTO) to delineate the areas of scarred myocardium (ventricular bipolar voltage ≤0,5 mV – dense scar; 0,5-1,5 mV – border zone; ≥1,5 mV – healthy tissue).

Substrate modification - catheter elimination of abnormal LV electrograms during SR (fractionated, splited, low-amplitude/ long-lasting, late potentials, pre-systolic) and linear ablation based on the findings of scar areas and proximity to anatomic obstacles. Pace-mapping techniques were used when LV capture was possible.

Results

- VT was induced in all P (1-7 morphologies; cycle 300-600 ms) and interrupted with bursts or external DC shocks.
- LV access via transeptal catheterization (3P) or aortic retrograde approach (14P).
- Pace-mapping match with the induced VT ≥11 out of 12 ECG leads obtained in 42% of the cases.
- Abnormal electrograms were identified and ablated in all P. Non-inducibility was achieved in 65% of the cases.
- In 3P, due to hemodynamic deterioration VT inducibility was not performed.
- There was one pericardial tamponade drained successfully.
- Total duration of the procedure - 130±50 mn / fluoroscopic time - 16±12 mn / RF application time 23±11 mn.
- During a mean follow-up of 14 months, 29% had VT recurrences treated via ICD, 2P underwent redo ablation, 1P died from pneumonia and 4P had hospital readmissions due to HF decompensation.

Conclusion

Catheter ablation based on substrate modification is feasible and safe in P with unmappable recurrent VT and severe LV dysfunction. This approach may be useful, with potential benefits in reducing VT burden.