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Substrate-based ablation in patients with frequent appropriate ICD therapy and dilated cardiomyopathy: long-term experience with high-density mapping

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Recurrent ventricular tachydisrhythmias (VT) episodes have a negative impact in the outcome of patients (P) already with an implantable cardioverter-defibrillator (ICD). Elimination of arrhythmic reentry circuits represents a difficult challenge, mainly due to the induction of intolerable VTs, with multiple ECG morphologies, requiring rapid interruption. Substrate guided ablation has been used as a promising approach strategy to treat recurrent VTs. Aim: to assess long-term results of a VT substrate-based ablation using high-density mapping in P with an ICD, severe left ventricular (LV) dysfunction and recurrent appropriate ICD therapy. Methods: 16P (12 men, non-ischemic cardiomyopathy 67%, 55 ± 13 years, LV ejection fraction 32 ± 6%) and recurrent appropriate shocks despite antiarrhythmic drug therapy and optimal heart failure medication. All P underwent a protocol of ventricular programmed stimulation (600 ms/S3) to obtain baseline VT documentation. A sinus rhythm (SR) voltage map was created using a 3D electroanatomic mapping system (CARTO) with a high-density mapping catheter (PentaRay) to delineate areas of scarred myocardium (ventricular bipolar voltage ≤0,5 mV – dense scar; 0,5-1,5 mV – border zone; ≥1,5 mV – healthy tissue) and provide high-resolution electrophysiological mapping. The substrate modification included catheter elimination of local abnormal ventricular activities (LAVA) - fractionated, splited, low-amplitude/long-lasting, late potentials, pre-systolic potentials - and linear ablation to obtain scars homogenization and scar dechanneling. Pace-mapping techniques were used when capture was possible. LV approach was retrograde in 6 cases, transeptal in 4 and endo-epicardial in 2 cases. In 2P the ablation was performed in the right ventricle. Results: VTs were induced and interrupted with bursts or external DC shocks. LAVA were identified and ablated in all P. Eleven P underwent modification of scar areas. The mean duration of the procedure was 153 mn (103-218 mn), with radiofrequency ranging from 18 to 60 mn (mean 33 min), and a mean fluoroscopy time of 16 mn. Non-inducibility was achieved in 75% of the cases. There was 1 pericardial tamponade drained successfully. During a follow-up of 48 ± 18 months, 75% had no VT recurrences, 2P underwent redo ablation, 1P died from stroke. Conclusion: Catheter ablation of VT based on substrate modification guided by high-density mapping is feasible and safe in P with LV dysfunction. This approach may be of clinical relevance, with potential benefits in reducing VT burden.