CLINICAL AND ELECTROPHYSIOLOGICAL CHARACTERISTICS OF PURKINJE-RELATED VENTRICULAR ARRHYTHMIAS ASSOCIATED WITH POLYMORPHIC VENTRICULAR TACHYCARDIA AND VENTRICULAR FIBRILLATION

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Introduction: Little is known about the characteristics of Purkinje (P)-related ventricular arrhythmia (VA) that initiates polymorphic ventricular tachycardia (PMVT) and ventricular fibrillation (VF) and the outcome of ablation.

Method: We reviewed clinical and procedure records of 498 patients who underwent ablation of VA in our institution from 2005 to 2012. Those who had ablation of P-related VA were included in the analysis.

Results: A total of 68 P-related VA were ablated in 62 (48.4% male) patients. The most common ablation sites were the left anterior (LAF) and posterior fascicles (LPF) [n=6 (8.8%) and n=21 (30.9%) respectively], aortomitral continuity (n=13, 19.1%), anterior and posterior papillary muscles [n=3 (4.4%) and n=5 (7.4%) respectively], right ventricular outflow tract (n=6, 8.8%), false tendon and moderator band (both n=4, 5.9%). The no. of VA morphologies were 1.6±1.0 per patient and 1.4±0.6 per ablation site. 16 (25.8%) also had non P-related VA ablated. Of the 15 (24.2%) patients who had prior PMVT or VF, idiopathic VF was diagnosed in 7, long QT syndrome in 1, catecholaminergic PMVT in 1, VF with dilated cardiomyopathy in 2, and documented premature ventricular complex (PVC)-triggered PMVT in 4. Compared to those without PMVT or VF, patients with PMVT or VF were younger (35.9±11.9 vs 44.3±18.6 years, p=0.047), had higher ejection fraction (56.4±12.9 vs 39.2±24.9%, p=0.001), more mitral valve prolapse (55.6 vs 19.2%, p=0.03) and more likely to have VAs originating from the LAF or LPF (66.7% vs 29.8%, p=0.02). They also had a higher no. of ablation sites (1.5±0.5 vs 1.0±0.2, p=0.007) and morphologies (2.3±1.1 vs 1.4±0.8, p=0.001) for P-related VA, and shorter P potential to QRS interval (37.6±14.7 vs 53.4.4±27.7ms, p=0.003). In 1 patient who had spontaneous PMVT triggered by P-related PVC during procedure, fractionated potentials and P potentials were recorded at mid-diastole on the proximal and distal ablation electrodes respectively. No difference in PVC burden, QRS duration, coupling interval, the presence or no. of non P-related VA was observed. There was no difference in procedural success between those with and without PMVT or VF [n=13 (86.7%) vs 46 (97.9%), p=0.14], however, 1 patient who underwent ablation for idiopathic VF died of refractory VF within an hour of procedure.

Conclusion: P-related VAs associated with PMVT or VF were characterized by multiple origins and exits, and the short P-potential to QRS interval suggests involvement of the distal conduction system. Together with the findings of mid-diastolic fractionated potentials and P potentials during PMVT, the mechanism of PMVT or VF could be multiple reentrant circuits involving the distal Purkinje fibers and Purkinje-muscle junction. Benefit and risk of ablation needs to be carefully balanced as refractory VF could result.