Phase 2 reentry in man - DTU Orbit (07/10/2019)

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BACKGROUND Ventricular extrasystoles are characterized by a fixed coupling interval to the last QRST complex preceding it. OBJECTIVES We hypothesized that this QRST complex differed from QRST complexes of other sinus beats not followed by ventricular extrasystoles. Further, we investigated whether phase 2 reentry, demonstrated in animal experiments to initiate ventricular extrasystoles, ventricular tachycardia, and ventricular fibrillation, also plays a role in humans. METHODS We examined 18 patients with ventricular extrasystoles and/or ventricular tachycardia by signal averaging of the ECG (group A) or by single-beat analysis of intracardiac electrograms (group 13). Group A consisted of six patients without structural heart disease and one patient with the Brugada syndrome. Six of the seven patients had right ventricular outflow tract ventricular extrasystoles. Group B consisted of 11 patients undergoing radiofrequency ablation. Eight of the 11 patients had right ventricular outflow tract extrasystoles. RESULTS In six of the seven patients in group A, we demonstrated significant ST-elevation and/or T-wave changes in the sinus beat preceding ventricular extrasystoles compared with the second last sinus beat in one or more of the three orthogonal leads X, Y, and Z. In 9 of the 11 patients in group B, single-beat analysis of unipolar and bipolar electrograms recorded close to successful ablation sites demonstrated similar changes, that is, ST-elevation (median peak voltage gradient 150 μV, range 0-1,700) and T-wave changes in the sinus beat prior to ventricular ectopy. In addition, J-point elevation was demonstrated in several cases. In total, significant changes were demonstrated in 15 of the 18 patients studied (83%). CONCLUSION J-point elevation, ST-elevation, and T-wave changes documented in the last sinus beat prior to ventricular extrasystoles are in agreement with phase 2 reentry, suggesting that this may be the responsible mechanism for ventricular extrasystoles and ventricular tachycardia/fibrillation. The phenomenon has been demonstrated in only animal experiments to date.

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