Effects of Nifekalant Hydrochrolide on the Spiral-Type Functional Reentry in 2-Dimensional Rabbit Ventricular Myocardium

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[Aim] Nifekalant hydrochrolide (NF), a specific I_{Kr} blocker, is supposed to be effective in preventing life-threatening ventricular tachyarrhythmias. However, actions of NF on the functional reentry remain unclear. We investigated the issue in rabbit hearts perfused in-vitro. **[Methods]** 2D subepicardial myocardial layers (~1 mm thick) were prepared by cryoablation of the left ventricular cavity. Action potential signals were recorded and analyzed by a high-resolution optical mapping system. **[Results]** Under basic stimuli, NF (0.1μM) caused a significant prolongation of the action potential duration (APD) without affecting conduction velocity. The longer the CL, the larger the APD prolongation (by 22.7±4.0% at CL400 ms, and 31.3±6.8% at CL800 ms, n=5, $P<0.05$). Ventricular tachycardias (VTs) induced by cross-field stimulation in the presence of NF showed a longer CL (181.9±6.9 ms, n=15, NF vs. 145.4±4.1 ms, n=13, control), a shorter diastolic interval (17.3±1.7 ms vs. 19.4±1.0 ms) and a shorter duration (VTs>30s were 1/13 vs. 4/15). Spiral-type excitations after NF were characterized by a greater meandering, a longer functional block line and more frequent break-up of rotors via wavefront-tail interactions. **[Conclusion]** NF compromises the dynamic stability of spiral excitations in the heart through a modulation of repolarzation. This would prevent the perpetuation of functional reentry.