857-2 Effect of Phenytoine Provocation on Dispersion of Repolarization in Congenital Long QT Syndrome

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Background: Syncope or sudden cardiac arrest is associated with sympathetic stimulation in LQT1. LQT2 and LQT3 patients are more susceptible to arrhythmias at lower heart rates. Spatial dispersion of repolarization is estimated by QT dispersion (QTd = QTmax - QTmin) whereas transmural dispersion of repolarization (TDR) is estimated by the interval from T peak to T end (Tp-e). This study compares the effect of phenytoine on QTd and TDR in genotyped long QT syndrome (LQTS) to control (C).

Methods: 17 patients (8 F, 26.9 ± 11.6 years) with LQT1, 15 patients (8 F, 26.7 ± 12.9 years) with LQT2/3, and 18 age- and gender-matched normal controls (10 F, 26.3 ± 12.3 years) were given a phenytoine bolus intravenously at 2 mg/kg. At baseline and at peak phenytoine effect, BP, QT, RR, Bazett’s QTc, precordial QTd, and Tp-e intervals were determined blinded to the patient’s clinical and genotype status.

Results: Baseline QT intervals (482±45 ms and 542±76 vs. 414±27 and 475±26 ms and 516±24 vs. 452±28) were significantly longer in LQT1 and LQT2/3 compared to control (p < 0.001). Baseline QTd and Tp-e in LQT2/3 were greater than both LQT1 and control; QTd = 84±28 ms (LQT2/3), 53±25 (LQT1), 44±15 (C), p < 0.001 and Tp-e = 121±28 ms (LQT2/3), 99±21 (LQT1), and 90±11 (C), p < 0.0003. Phenytoine significantly increased blood pressure and slowed heart rate in all groups as expected. Phenytoine exerted no significant effect on either QTd or Tp-e in all groups. Subgroup analysis of symptomatic LQT1 (n=5) and symptomatic LQT2/3 (n=4) demonstrated a significant change in TDR following phenytoine. In symptomatic LQT1, Tp-e decreased by 9 ± 27 ms whereas Tp-e increased by 16 ± 22 in symptomatic LQT2/3, p < 0.02. Phenyletoine tended to impact QTd differentially as well between symptomatic LQT1 and symptomatic LQT2/3 (16 ± 11 vs. 4 ± 12).

Conclusions: Phenyletoine-induced bradycardia decreased TDR in symptomatic LQT1 but increased TDR in symptomatic LQT2/3. The observed effects of phenytoine are consistent with the protective effect of beta-blocker therapy in LQT1 and the increased arrhythmogenicity noted during non-exertional states in LQT2/3 patients.