

Vectorcardiographic measurements of QT interval in a paediatric LQTS population

Diamant U.B.(1), Winbo A.(2), Jensen S.M.(1), Rydberg A.(2)

1 Heart Centre and Department of Public Health and Clinical Medicine,

2 Department of Clinical Sciences, Pediatrics, Umeå University, Umeå, Sweden

Introduction

Due to the high and variable heart rate in a paediatric population, measurements of corrected QT interval for heart rate (QTc) are even less reliable than in adults. Computerized electrocardiograms are now widely used but it has been shown that the diagnostic interpretation provided by the automated analysis system may fail to identify many carriers of mutations causing LQTS.

The aim of this study was to investigate if vectorcardiogram (VCG) according Frank lead system could be superior to 12-lead ECG in providing correctly LQTS diagnosis in children.

Material and Methods

The LQTS population consisted of 35 genetically confirmed carriers of mutations in the KCNQ1 gene (n=29) and KCNH2 gene (n=6). The control group comprised of 35 age and gender matched healthy children (of which 10 were confirmed non-carriers). Mean age in the LQTS group and the control group was 7.0 and 6.7 years respectively (range 0.5 to 16 y). There were 20 girls and 15 boys in each group.

Standard 12-lead ECG and VCG were recorded in all study participants. QT intervals were measured manually by one author (AW) blinded to the patients genotype and with a documented small intraobserver relative error (1.3%). The 12-lead ECG automatic measurements and interpreting of QTc, were performed with a Mac®5000 (GE Medical system) and the VCG automatic measurements were made with Mida®1000, CoroNet (Ortivus AB). A QTc >440 ms by either method was considered prolonged and indicative of LQTS.

Results: 30 LQTS children out of 35 (83%) were correctly diagnosed using the VCG automatic measurements of the QTc. The manually assessed QTc, automatic measured QTc(ECG) and automatic interpreting from standard ECG correctly diagnosed 29 (82%), 24 (69%), 17 (49%) respectively, of 35 LQTS children.

Conclusions: This study showed comparable results for VCG automatic measurements and a highly experienced observer in the ability to provide correct LQTS diagnosis in children, based on QTc measurements. The automatic interpreting of the ECG showed a poor ability to render correct diagnosis in a paediatric LQTS population.