Vectorcardiographic recordings of QT interval in a paediatric LQTS population

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Introduction

Due to a high and variable heart rate in the paediatric population, measurements of corrected QT interval (QTc) are even less reliable than in adults.

Computerized ECGs are widely used, but it has been shown that the automated analysis systems fail to identify carriers of Long QT syndrome (LQTS).

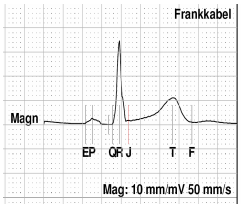
The aim of this study was to investigate if vectorcardiographic recordings (VCG-according to the Frank lead system) could be superior to 12 lead ECGs in providing correct diagnosis in children.

Material and Methods

Thirty-five LQTS mutations-carriers (15 boys; 20 girls) with confirmed mutations in the *KCNQ1* (n=29) and *KCNH2* (n=6) genes were included.
The control group comprised of 35 age and gender matched healthy children. Genetic testing was used as gold standard.

Each child underwent a 12 lead ECG and a VCG registration in rest and supine position.

Vectormagnitude



Manual measurements of QTc in 12 lead ECGs were performed by one author (AW) with documented small intra-observer relative error (1.3%).

Automatic measurements and interpretation of QTc were performed with a Mac© 5000 (GE Medical system) and the VCG automatic measurements were made with MIDA©1000 /CoroNet, Ortivus AB.

Bazett`s formula was used for rate correction in all methods.

A QTc >440 ms by either method was considered prolonged and indicative of LQTS

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Results

Mean age in the LQTS group and control group was 7.0 and 6.7 years respectively (range 0.5-16 years).

Thirty LQTS children out of 35 (83%) were correctly diagnosed using the VCG automatic QTc measurements.

The manually assessed QTc, automatic measured QTc and automatic QTc interpretation from 12 lead ECGs correctly diagnosed 29 (82%), 24 (69%) and 17 (49%) respectively, of the 35 LQTS children.

In the control group 6 healthy children were assessed as false positive LQTS carriers based on manually measured QTc and ECG automatic QTc interpretation (17%), 7 by VCG automatic measured QTc(20%) and 8 by ECG automatic measured QTc (23%) (Table 1).

Table 1	*Carrier of LQTS mutation n=35*	*Healthy children n=35*
Diagnosed as carrier of LQTS by		
VCG automatic measured QTc	**30**	**7**
ECG automatic measured QTc	**24**	**8**
ECG automatic interpret QTc	**17**	**6**
ECG manually measured QTc	**29**	**6**
Diagnosed as noncarrier of LQTS by		
VCG automatic measured QTc	**5**	**28**
ECG automatic measured QTc	**11**	**27**
ECG automatic interpret QTc	**18**	**29**
ECG manually measured QTc	**6**	**29**

Conclusions

Based on QTc measurements, this study showed comparable results for automated VCGs and a highly experienced observer in the ability to provide correct LQTS diagnosis in children.

The automatic interpretation of the ECG showed a poor ability to render correct diagnosis in a paediatric LQTS population.