

Predictors of ECG failure for subcutaneous ICD in children: a prospective multicenter study

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Introduction: The subcutaneous Implantable Cardioverter Defibrillator (SICD) shows promise for select patients at risk for sudden death. However, patients need to pass an ECG screening (ECG-S) test before they can receive an SICD. Predictors of ECG-S failure in children are unclear.

Methods: Children ≤ 18 years with a pre-existing ICD underwent SICD ECG-S. Electrocardiographic and demographic data were analyzed for factors predictive of failure.

Results: Seventy-three patients (44 males (60%), mean age 14.2 ± 3.3 , range 5-18 years) with hypertrophic cardiomyopathy (n= 24), long QT syndrome (n=18), other inherited arrhythmia syndromes (n=20), congenital heart disease (n=9), and miscellaneous (n=2) with an existing transvenous ICD system underwent prospective ECG-S. Nineteen (26%) failed ECG-S. Failed patients had a longer QTc duration (457 ms vs 425 ms, $p=0.03$), QRS duration (120 ms vs 98 ms, $p=0.04$), and R:T amplitude ratio in aVF (5 v 4, $p=0.001$). Multivariable logistic regression identified QTc (OR 4.31; $p=0.04$), QRS duration (OR 4.93, $p=0.03$), R:T ratio in aVF (OR 3.13, $p=0.08$) as predictive of failure. A risk score with one point each for QTc >440 ms, QRS >120 ms, and R:T ratio <6.5 in aVF was associated with probabilities of 15.4% (1 point), 47.4% (2 points) and 88.6% (3 points) for failure respectively.

Conclusion: SICD ECG-S failure occurred in 26% of children which is higher than the reported incidence in adults. Factors predicting ECG-S failure included longer QTc, longer QRS duration, and a lower R:T ratio in aVF.