Diagnosing The Heart Disease

Long QT Syndrome with Sinus Arrhythmia

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Longest cycle

Shortest cycle

An ECG showing sinus arrhythmia, that is a difference of 25% or more between the longest cycle length and the shortest cycle length.

An ECG with slight variations in cycle lengths but not significant enough to classify as sinus arrhythmia.

Sensitivity and Specificity: >440/<640 ms

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<thead>
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<th>Sensitivity</th>
<th>Specificity</th>
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<tbody>
<tr>
<td>Shortest cycle</td>
<td>0.85</td>
<td>0.74</td>
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<tr>
<td>Longest cycle</td>
<td>0.87</td>
<td>0.95</td>
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| Bazette formula: QTc = QT/CL

An ECG with sinus arrhythmia and the QTc calculated using the longest cycle length and the shortest cycle length. The values differ greatly. The value of 440 ms indicates Long QT Syndrome, whereas the value of 418 ms clearly indicates no Long QT.

Average cycle length is 890ms, so calculate QTc with similar CL (640 ms). In the above ECG the most similar is 920 ms, so we would use that cycle length and the subsequent QT interval.

Long QT Syndrome (LQTS) is a genetic disorder of the heart where the time the heart takes to chemically repolarize is abnormally long. There are two symptoms of LQTS. First, syncope or passing out. Second, is sudden death. To diagnose LQTS a simple calculation is made from an Electrocardiogram (ECG). It is known as the Bazette formula and is QTc = QT/CL^0.5. A QTc value above .47ms for boys and .48ms for girls is diagnostic for LQTS.

Many children show sinus arrhythmia on their ECG. Sinus arrhythmia is a marked difference of 25% or more between shortest cycle length and longest cycle length. In other words it is an irregular heartbeat, and it is caused by respiration patterns. The problem with sinus arrhythmia is that it makes it very difficult to calculate the QTc. This is because while the cycle length is changing from beat to beat, the QT interval changes over time. So the issue is which cycle length to use, the longest, shortest or neither. The common method in the world of cardiology is to use the shortest cycle length and the QT interval that follows. The problem with this is that you will misdiagnose many "normal" children as having LQTS. Our study evaluated five different ways to calculate the QTc with those that show sinus arrhythmia so as to correctly diagnose the Long QT Syndrome. Our results show that an averaging of all cycle lengths and all QT intervals