Diagnostic Accuracy of Computerized QT Measurement for ECGs

Zachary Gilbert, MD, Osama Hallak, MD, Vijai Tivakaran, DO, Vaskar Mukerji, MD
Kettering Health, Cardiovascular Disease Fellowship, Kettering, OH

OHIO CHAPTER
AMERICAN COLLEGE of CARDIOLOGY®

Abstract / Introduction

- The clinical importance of the QT interval on the electrocardiogram (ECG) is due to the potentially fatal ventricular arrhythmias that can result from significant prolongation.
- There are many medications that are used in a physician's daily practice in the inpatient and outpatient setting that may prolong the QT interval predisposing patients to this increased risk.
- Multiple methods have been identified to measure the QT accurately, however most healthcare providers rely on the machine to calculate it for them, and this can occasionally lead to fatal events.
- Here we present our findings on the diagnostic accuracy of machine ECG calculation vs manual calculation of the QT interval while highlighting the potential limitations of machine QT interpretation.

Methods

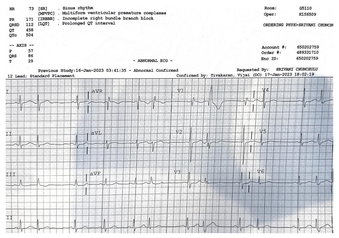
- We reviewed 250 ECGs in random patients. We compared the computer determined QT interval with our manual measurement.
- The threshold method was utilized to manually measure the QT intervals.
- The Bazett formula was utilized to calculate the QTc.
- We looked for discrepancies in the diagnostic algorithm and the computerized measurement of the QT intervals.
- These data were analyzed for any association with the underlying rhythm.

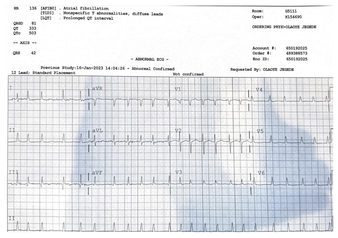
Results

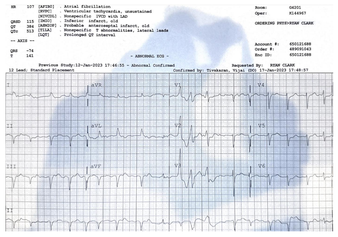
- The underlying rhythm in 212/250 ECGs was normal sinus rhythm.
- Atrial arrhythmias were present in 32/250 ECGs, 2 had multifocal atrial tachycardia (MAT), and 4 had 2nd or 3rd degree AV block.
- 195/250 ECGs were male and 55/250 were female.
- There were differences noted in the computer determined and manually measured QT intervals where the underlying rhythm was an atrial arrythmia (atrial tachycardia, fibrillation or flutter), and in the presence of AV blocks, baseline artifact, abnormal ST-T waves, and U waves.

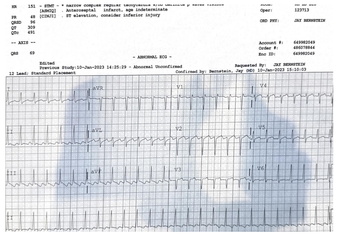
Examples

Incorrectly measured

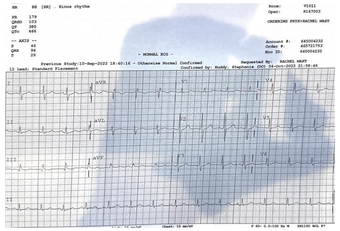


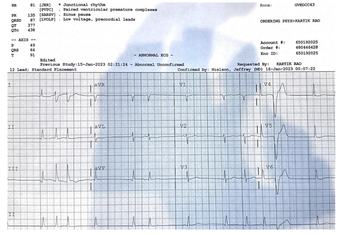


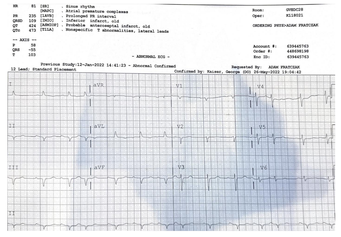


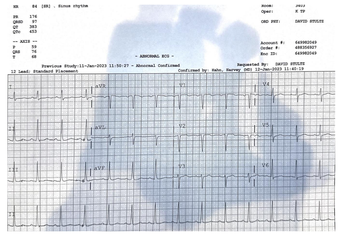


Correctly measured

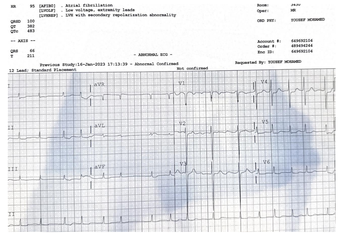


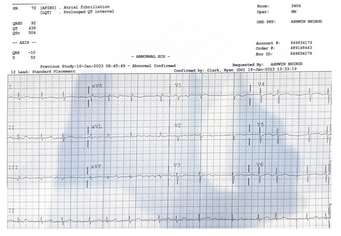


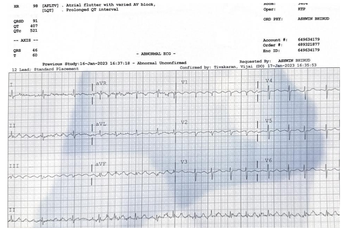




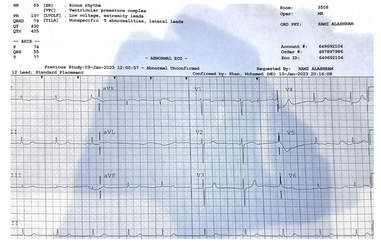
Incorrectly measured

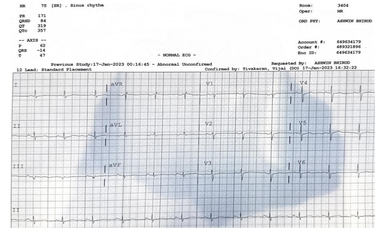






Correctly measured





Conclusion

- This project suggests that in selected cases, if an accurate reading of the QT interval is needed, then manual confirmation is recommended. This would be particularly important if the QT interval reading is borderline or when the doses of certain medications are being titrated. Since this was a small study, reassessment of the findings should be performed by extending the study to a larger number of ECGs which will enable statistical analysis. In future we should consider other ECG diagnoses that may be discrepant per computer analysis.