

New insights into the evaluation of broad QRS complexes

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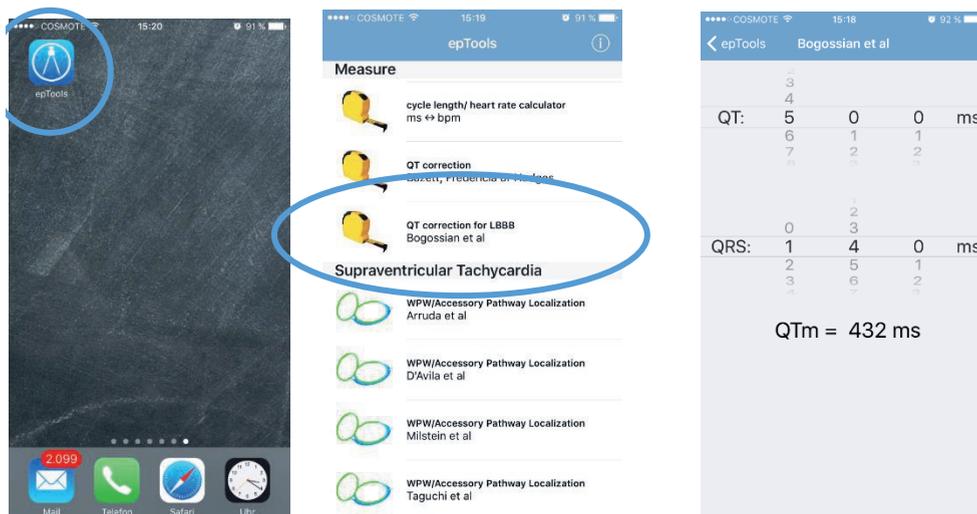
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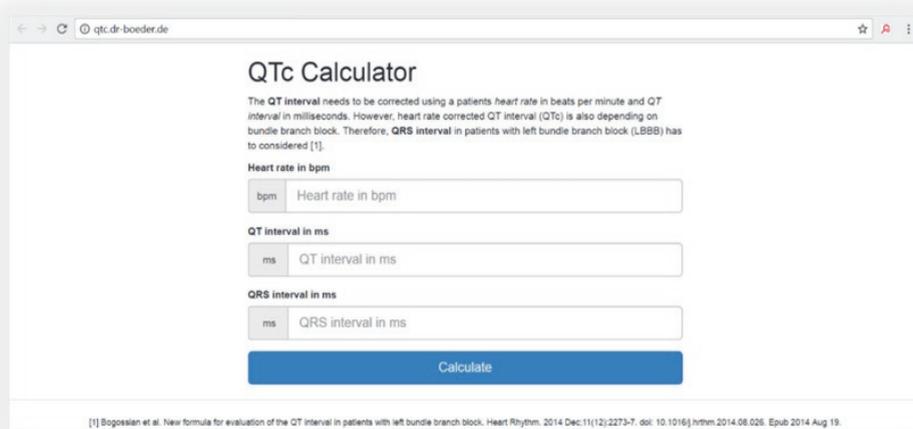
Given the prevalence and clinical impact of heart rhythm disorders, this work, which aimed to provide practical tools and insights to facilitate the diagnosis and treatment of these disorders, has significant potential impact. Here, we present a short analysis of its potential applications and provide evidence of the impact that it has already made on the scientific and clinical communities.

First of all, this work has impact for patients, since QTc is an important marker. Incorrect assessment of QTc may lead to inappropriate or incomplete treatment (e.g., unnecessarily avoiding QT-prolonging drugs). In particular, for non-EP cardiologists the findings are relevant, as they can now quickly and easily estimate QTc, even in patients with pacing, heart failure or RBBB. The QT-estimation formula in LBBB has meanwhile become part of different modern tools. Via Apps, Internet sites or algorithms, our work has made it possible to have an additional option for assessing ECG measurements in patients with LBBB.

The App “epTools” put our formula in the portfolio of different QT estimations like Bazett, Fredericia or Hodges.



The internet site “qtc.dr-boeder.de” also offers the possibility to calculate quickly the corrected QT interval in patients with LBBB.



Colleagues from Australia published a manuscript regarding “Measurement and Management of QT Interval Prolongation for General Physicians”¹³⁸. Part of the Paper is an algorithm presented in Figure 2. There, the cardiologists suggest also to general physicians to apply the formula for the QT interval estimation in broad QRS complexes:

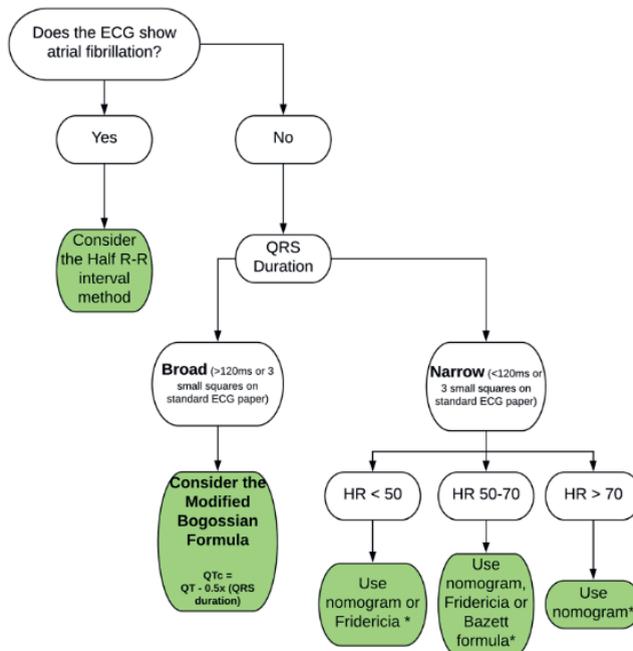


Figure 2 Flowchart for an approach to correcting QT interval. The asterisk indicates Framingham and Hodges formulae can be used in any of these situations, but are complex equations and have been omitted from this flowchart for simplicity. HR, heart rate in beats per minute.

The second and third part of this thesis gives physicians additional support for decisionmaking in patients with broad QRS complexes [either due to intrinsic conduction delay or due to premature ventricular capture beat (PVC)]. Especially the description of “spot diagnosis” helps interventional electrophysiologists to target easier the ablation region of PVCs.

Although the ECG is known as an often used examination tool, its correct appraisal is still very challenging for both young and experienced physicians. With the development of artificial intelligence (AI) in the last years, diagnosis may become easier, for all doctors.

AI may cause that doctors do not learn easily the (patho)physiology of the QRS duration because there is no big need anymore to understand it.

However, AI must be guided by human knowledge. Therefore, tools like the formula presented in this thesis could facilitate a better and quicker appraisal of the ECG, which could also benefit future AI tools. Also our spot diagnosis for PVCs arising from the left ventricular inflow tract, or even more important for PVCs arising from the moderator band and leading to fatal arrhythmias, could help physicians to quickly achieve the correct diagnosis.

In the pluralism of published manuscripts nowadays, it is not possible to read and to spread all the knowledge in time. However, when implemented in digital tools, this knowledge could be shared easily via apps or similar modern tools, perhaps even without the necessity to go through every single manuscript. A good example therefore is the aforementioned app “EP tools”, which implemented our QT-formula in their app. Now the formula is visible for many users with a quick view on the mobile phone or the tablet. A good future perspective is to develop apps, which will give a good appraisal of the ECG just by taking a snapshot of the recorded heart rhythm. Daily physicians’ practice but also treatment of patients could improve enormously by this development.