An Issue Waiting to be Clarified: Effects of the QT Prolonging Drugs on Tp-e Interval

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We read the article 'Impact of Psychotropic Drugs on QT Interval Dispersion in Adult Patients' by Claudio et al. with great interest[1]. They investigated in this study the effects of psychotropic drugs on QT interval (QTI), corrected QT interval (QTc), and QT dispersion (QTd). They concluded that psychotropic drugs increased QTd and QTc interval.

QTd is the most frequently used non-invasive method to quantify electrical myocardial heterogeneity. However, there are variable results in studies related to QTI due to the technical limitations in measurements[2]. It is well-known that the reproducibility of QTI measurements is low both in manual and automatic measurements[2]. In this study, the measurements were performed digitally by four cardiologists using the Preview software with a magnification of 300%. We appreciated the method used in this study in order to obtain more accurate data. It is recommended that measurements be done digitally at least by two cardiologists[2].

Quantifying electrical myocardial heterogeneity and transmural dispersion of repolarization (TDR) was introduced in the beginning of 2000's[3]. The myocardium comprises 3 distinct myocyte types - namely, endocardial, epicardial, and midmyocardial M cells[3]. Although these myocytes are morphologically similar, they exhibit different electrophysiological characteristics. M cells have typically the longest action potential. Furthermore, when myocardium is exposed to conditions prolonging the repolarization phase, such as bradycardia or agents, the action potential duration of the M cells are more prolonged than in the other cells[3]. While repolarization of the epicardial region ends at the peak of T-wave, repolarization phase of M cells ends at the end of T wave[3]. Therefore, the time between the peak and end of the T wave is called Tp-e interval, as an index of TDR.

The role of the TDR in the prediction of possible life-threatening arrhythmic events has been demonstrated in the Brugada, short-QT and long-QT syndromes and coronary artery disease[3]. Previously, we showed that TDR was increased in patients with obstructive sleep apnea and chronic arsenic exposure[4,5]. However, there is no study investigating the effects of QT prolonging drugs on TDR. The repolarization phase of myocytes in midmyocardial and endocardial layers may be more influenced by the drugs. In this context, psychotropic drugs may be increasing QT interval duration via Tp-e interval prolongation. In conclusion, it seems that adding the data related to Tp-e interval to the study results might have completely illuminated the effects of psychotropic drugs on electrical heterogeneity of myocardium in many respects.

Keywords

Psychotropic /drugs therapeutic; Electrocardiography; Cardiovascular Diseases; Torsades de Pointes; Ventricular Fibrillation; Death, Sudden.

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Answer to Letter to Editor

We appreciate the authors' interest in our study and the valuable contributions on the subject.

The spatial dispersion of ventricular repolarization can occur in the transmural, trans-septal or apical-basal direction.[1,2]. A large number of publications has been dedicated to the study of cell diversity of the human myocardium and its heterogenic response to pharmacological agents.

Researchers such as Antzelevitch et al.[3] and Luo e Rudy[4] have tested several models in normal hearts and individuals with congenital long-QT syndrome, concluding that the properties of the M cell action potential critically participate on QT interval dispersion, mainly in the presence of drugs with binding capacity in the IKr and IKs channels[1,5].

Under this idea, in fact, the measurement of Tp-e is conceptually an electrocardiographic correlation truthful to the abovementioned concepts. In a recent article, in the coronary artery disease model, Karaman et al.[6] found an association between increased QT dispersion and the Tp-e interval with slowed coronary flow in coronary angiography (TIMI 1) in patients with acute coronary syndrome, when compared to the control group (TIMI 3)[6].

In our study, we chose to measure the QT dispersion, as it is a powerful tool that can be fully incorporated by general practitioners that prescribes psychotropic drugs in the routine monitoring of a potentially fatal complication of their patients[7]. However, we expect the Tp-e interval, considering its solid results in the literature, also to become a routine tool in the increasingly frequent use of these drugs.

Sincerely,

Bruno de Queiroz Claudio

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