Arrhythmias - Electrocardiography (ECG)

QT interval estimation in patients with right bundle branch block using validated formulas for left bundle branch block

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BACKGROUND: Adequate measurement of the QT interval is of paramount importance in order to identify patients at higher risk for ventricular arrhythmias. Previous studies have described different methods to estimate baseline QT in patients with left bundle branch block (LBBB). However, the evidence regarding the assessment of QT interval in the setting of right bundle branch block (RBBB) is scarce.

PURPOSE: We aimed to analyze the feasibility and accuracy of the different formulas described for LBBB in the estimation of the QT interval in RBBB.

METHODS: We enrolled patients who underwent left sided electrophysiologic procedures. All patients were in sinus rhythm and had narrow QRS. Pacing was performed from the left atrial appendage for baseline measurements, and from the left aspect of the interventricular septum (selective capture of the left bundle was attempted) to measure RBBB QT and QRS. Pacing cycle length was 800 ms or slightly below patients´ intrinsic rhythm at both locations. Measurements were performed manually (using digital calipers) according to current recommendations and corrected using Bazett. Validated formulas for LBBB QT considered are described in table 1.

RESULTS: 50 patients (42 cryoballoon pulmonary veins isolation (PVI), 4 radiofrequency PVI, 4 concealed left accessory pathways). 70% were male. Mean age was 62 ± 11 years old. Left ventricle ejection fraction was 58 ± 10%. 66% and 60% of the patients were taking beta-blockers and antiarrhythmic drugs, respectively. Mean pacing cycle length was 707 ± 99 ms. Baseline measurements: QRS 95 ± 10, QT 391 ± 36, QTc 467 ± 39 ms. RBBB measurements: QRS 165 ± 21, QT 448 ± 46, QTc 531 ± 52 ms. Correlations between baseline and estimated QTc were good for all the formulas (table 1). Reliability analysis showed that both Yankelson and Wang methods had the highest intraclass correlation coefficients (ICC) when trying to estimate baseline QTc.

CONCLUSIONS: Previously described formulas for LBBB exhibit marked differences regarding reliability in the estimation of QTc interval in the setting of RBBB. According to our results, Yankelson's method shows the most consistent agreement when estimating baseline QTc interval in patients with RBBB.

Table 1.

LBBB METHOD	Formula to estimate baseline QTc	Pearson's R correlation coefficient	CI (95%)	Intraclass correlation coefficient	CI (95%)
Yankelson	QTc - QRS + 95 (m) or 88 (f)	0.805	(0.632-0.977)	0.882	(0.788-0.934)
Bogossian**	QT - (QRS/2)	0.813	(0.644-0.982)	0.756	(-0.127-0.919)
Wang**	QT - (0.86*QRS - 71)	0.801	(0.627-0.974)	0.834	(0.465-0.930)
Tang-Rabkin	0.945*QTcRabkin - 26	0.722	(0.521-0.923)	0.711	(0.019-0.885)
Rautaharju	QT - 155*(60/heart rate - 1) - 0.93*(QRS - 139) - 22 (m) or - 34 (f)	0.780	(0.599-0.961)	0.105	(-0.017-0.381)

**Bogossian and Wang required additional HR correction (Bazett).

Abstract Figure 1. Bland-Altman

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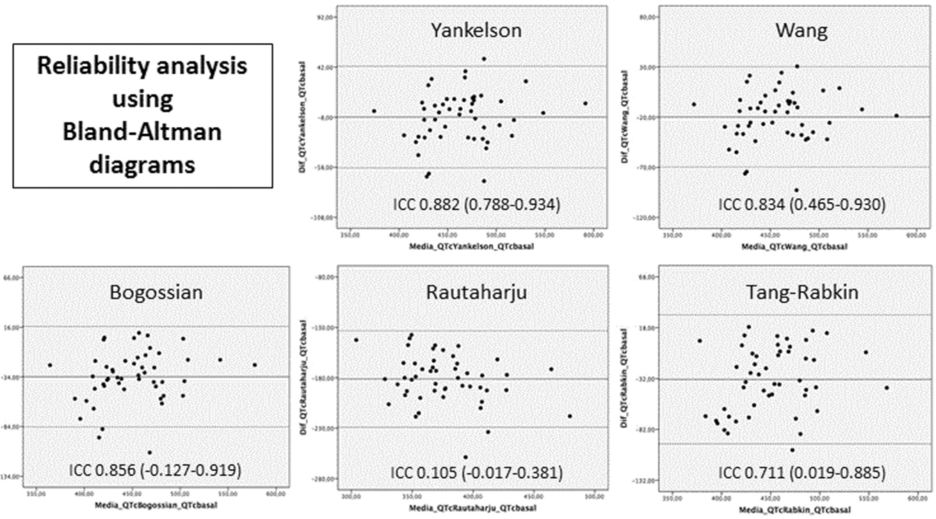

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