LETTER TO THE EDITOR

Beat-to-Beat QT Interval Variability in Atrial Fibrillation with and without Congestive Cardiac Failure

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To the Editor:
Atrial fibrillation (AF) is associated with an increase in cardiovascular mortality¹ and can exist with and without congestive heart failure (CHF), which is associated with abnormal autonomic function. QT variability follows HR variability closely and a recent measure, beat-to-beat QT interval variability appears to be an important measure of cardiac repolarization lability.² We found that QT variability significantly increases during challenges associated with an increase in sympathetic activity.³ An increase in sympathetic activity and a decrease in cardiac vagal activity make the myocardium vulnerable to fatal arrhythmias. In the present study, we sought to test the hypothesis that repolarization lability is significantly increased in patients with AF with CHF compared to those without CHF during sinus rhythm.

The subjects were outpatients with a diagnosis of atrial fibrillation with and without CHF. There were 9 patients with AF and CHF (6 males and 3 females; age: 67 ± 16 years) and 6 patients with AF and no CHF (5 males and 1 female; age: 64 ± 12 years).

Electrocardiogram (ECG) was continuously acquired for 5 minutes in supine posture in lead II configuration at a controlled breathing rate of 12/minute. QT analyses were conducted on 256-second segments of ECG data sampled at 1000 Hz. These segments were not associated with AF. This

	With CHF (n = 9) Supine (Mean ± SD)	Without CHF (n = 6) Supine (Mean ± SD)	P
HRm (bpm)	78 ± 19	74 ± 13	NS
QTc (ms)	460 ± 69	490 ± 36	NS
HR–QT coherence (0–0.5 Hz)	0.18 ± 0.05	0.29 ± 0.14	<0.04
QTvi	–1.01 ± 0.39	–1.64 ± 0.48	<0.02

QT variability algorithm has been described by Berger and co-workers in detail and has been used by his and our groups in previous studies.^{2,3} The HR and QT interval variability measures were calculated from the instantaneous HR and QT time series of 1024 points (256 seconds). A normalized QT variability index was calculated as described previously.^{2,3}

$$QTvi = \text{Log}_{10}[(QTv/QTm^2)/(HRv/HRm^2)]$$

We used 2-tailed *t*-tests with a probability level of <0.05 as significant.

Results showed a significantly higher QTvi and a lower mean coherence in 0–0.5 Hz band in patients with CHF compared to those without CHF.

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These results show that CHF is associated with increased cardiac repolarization lability even in patients with AF and the decreased coherence between HR and QT may further add to the increase in mortality in these patients. These results do not appear to be due to the effect of medications as patients without CHF were not on beta-blockers or other drugs that decrease cardiac sympathetic activity.

REFERENCES

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