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**Electrocardiographic alterations in patients with chronic obstructive pulmonary disease**

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**Abstract**

Patients with chronic obstructive pulmonary disease (COPD) have an increased risk for cardiovascular events, and electrocardiography has an important role in detecting cardiac side effects of COPD-related hypoxia.

**Key Words:** Electrocardiography; Chronic obstructive pulmonary disease; QT interval; QT dispersion; Frontal plane QRS-T angle; Fragmented QRS

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**Core Tip:** QT parameters and frontal plane QRS-T angle may provide useful information regarding subclinical left ventricular dysfunction in patients with chronic obstructive pulmonary disease. In addition to standard electrocardiography parameters, these parameters may also be useful in demonstrating cardiac side effects of chronic obstructive pulmonary disease.

#### <sup>4</sup> TO THE EDITOR

I have read with great interest the article by Gupta *et al*<sup>[1]</sup> in which the authors reported the important electrocardiography (ECG) changes in patients with chronic obstructive pulmonary disease (COPD). Patients with COPD are at increased risk for cardiovascular events and ECG may provide useful information in monitoring these patients. In their article, Gupta *et al*<sup>[1]</sup> mentioned various important ECG alterations in patients with COPD. However, I would like to point out some other important ECG parameters which may be significantly associated with myocardial damage and should not be neglected in patients with COPD.

COPD causes alterations in the cardiac conduction system and is associated with increased risk for cardiac arrhythmias and cardiovascular events<sup>[2,3]</sup>. Importantly, repolarization parameters QT interval and QT dispersion are the most important ECG parameters in predicting future arrhythmic events, and these parameters seem to be significantly altered in patients with COPD<sup>[3,4]</sup>. Alterations in these repolarization parameters seem to be associated with COPD-related hypoxia and significantly predict arrhythmic events in patients with COPD. Hence, QT parameters may be useful in the monitoring of patients with COPD for adverse cardiovascular events.

Additionally, frontal plane QRS-T angle (fQRST angle) which could be easily measured from standard 12-lead ECG as the absolute difference between QRS axis and T wave axis, maybe a useful ECG parameter in the monitoring of patients with COPD. fQRST angle describes the angular difference between depolarization and repolarization directions and increased fQRST angle is significantly associated with adverse cardiovascular events<sup>[5,6]</sup>. Importantly, fQRST angle seems to be associated with subclinical myocardial damage even in the absence of overt cardiovascular disease<sup>[7-9]</sup>. Moreover, COPD seems to cause an increase in fQRST angle, and fQRST angle seems to be associated with the severity of COPD<sup>[10]</sup>. Therefore, as a sign of ventricular repolarization heterogeneity, fQRST angle may be a useful ECG parameter in the clinical evaluation of patients with COPD.

Another important ECG parameter that should be considered in patients with COPD may be QRS fragmentation. In addition to its predictive value for myocardial scar tissue, presence of a narrow fragmented QRS complex (fQRS) on ECG is significantly associated with subclinical myocardial fibrosis even in the absence of manifest cardiovascular disease<sup>[11-14]</sup>. Importantly, fQRS also seems to be a sign of hypoxia-related subclinical left ventricular dysfunction in patients with the pulmonary disease<sup>[15]</sup>. Although its clinical importance in patients with COPD has not been demonstrated yet, QRS fragmentation patterns may be useful in detecting subclinical left ventricular dysfunction in patients with COPD.

In conclusion, various ECG changes may be seen in patients with COPD, <sup>5</sup> and these ECG alterations seem to be associated with adverse cardiovascular events in these patients. However, besides the other ECG parameters, QT interval, QT dispersion and fQRST angle should be considered to demonstrate COPD's cardiac side effects. Also, evaluation of QRS fragmentation patterns may provide useful information in detecting subclinical myocardial dysfunction in patients with COPD.

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PRIMARY SOURCES

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