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Editorial

The Value of P Wave Interval and Dispersion in the Prediction of Atrial Fibrillation in the Emergency Setting

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Editorial

Atrial fibrillation (AF) is the most common rhythm disorder nowadays. Its prevalence is 10%–17% among the elderly, and has a prevalence of 0.12%–0.16% with regard to younger people [1]. Since atrial fibrillation is common it is frequently noticed in the emergency care units. Previously, certain electrocardiographic markers, such as P wave duration and dispersion have been introduced to recognize patients with an increased risk for atrial fibrillation.

Various underlying factors may contribute to the appearance of atrial fibrillation, e.g. high blood pressure, valvulopathies, lung diseases, heart surgery, hyperthyroidism, diabetes mellitus, chronic kidney disease or excessive caffeine or alcohol consumption [2,3]. However, in 10% of patients with lone atrial fibrillation no provoking substrates can be determined. Nevertheless, in most subjects myocardial histological changes (e.g. fatty degeneration, hypertrophy) and atrial dilatation are observed [4-7]. This structural remodeling is considered to play a pathological role in the secondary electrical transformation (anisotropy) of the myocardium that is manifested as the lengthening of the intra- and interatrial conduction times of the sinus impulses. Secondary to these conduction anomalies micro reentry mechanism may appear which has been shown to be a crucial cause in the genesis of atrial fibrillation. Due to its hemodynamic and thromboembolic consequences the prevention of AF has a significant clinical importance. Although palpitation, vertigo, dyspnea and chest/back pain are commonly observed, approximately 11% of patients with AF have been found to be asymptomatic [8].

Previously, it has been shown that the prolongation of the P wave and P dispersion (Pd) on the surface electrocardiogram can predict atrial arrhythmias including AF [9,10]. P wave duration of the surface electrocardiogram is determined as the section from the first positive electrical activity after the T wave (or the U-wave) to the intersection of the descending branch of P wave and the isoelectric line. During manual measurements, examiners should use three consecutive P waves in each leads for the analysis, and calculate their average duration. This value is the P wave duration in the given lead. It is desirable to use the longest P wave of the 12 leads as the P interval during the statistical analyses. P dispersion (Pd) is calculated as the difference between the longest and shortest P interval of the 12 leads. P interval and P dispersion can be corrected to the heart rate (Pmaxc, Pdc) according to Bazett's formula (Pmaxc = Pmax/√RR (msec), Pdc= Pd/√RR (msec)) [11].

Our previous clinical studies have demonstrated that the aforementioned atrial arrhythmia markers can be used effectively in the daily routine for the prediction of atrial fibrillation. Throughout our work clinical data of patients undergoing hemodialysis due to their end stage kidney diseases have been elaborated. In such patients the occurrence of atrial fibrillation is higher compared to the average population (approximately 10%). Our results have demonstrated that P wave duration and dispersion significantly increase at the end of the hemodialysis sessions compared to the values measured at the beginning of the treatment [12]. Therefore, the careful monitoring of these electrocardiographic markers can help to recognize patients with increased susceptibility for atrial arrhythmias, moreover it has an important role in the prevention of atrial rhythm disturbances in this population.

Recently, studies have also shown the clinical utility of P wave interval and dispersion in the prediction of atrial fibrillation in several clinical conditions (e.g. hyperthyroidism, post cardiac surgery etc.) [13,14]. However, only a few studies have been dealing with the diagnostic benefits of these ECG markers in the emergency setting so far. According to one of these publications in patients with acute pulmonary embolism, the increase of P dispersion may be a valuable predictor of early death [15].

Taking all the available data into consideration, we conclude that these non-invasive electrocardiographic measurements supposedly will play a growing clinical role in the arrhythmia prevention during the emergency evaluation of patients in the future.

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