Saah electrocardiography: An insight toward microwaveform of atrioventricular node and His bundle potentials

ECG studies on the atrioventricular (AV) node and His bundle potential using surface electrodes are scarce. Although electrogram is a well-established technique for studying the AV node and His bundle potentials (1), it is not a routinely used method due to its invasive examination. Microelectrode techniques have also been utilized to ascertain the differential responses of the cells of the AV node and His bundle to various physiological and pharmacological interventions (2). The PR segment is usually a flat and isoelectric line and represents the duration of the conduction from the AV node to His bundle. Although abnormalities of the PR segment are not very common, they can indicate certain cardiac disease states. On the other hand, depression or reciprocal elevation of PR segment relative to the P-wave onset is often regarded as being due to the presence of atrial repolarization wave (3–6), pericarditis, or atrial infarction (7).

The presence of microwavelets during this PR segment preceding the QRS complex, which can enhance an apparent depression or elevation (8) would be of potential clinical interest. For this reason, the paper of Chang et al. (9) published in this issue of the Anatolian Journal of Cardiology entitled "Surface electrocardiogram: could the atrioventricular nodal and His bundle potentials be recorded beat by beat on "Saah electrocardiogram"?" is of interest. The authors of this article have introduced a new surface ECG recording system termed as "SAN-Atrial-AVN-His (Saah) ECG" using PHS-A10 ECG created by PhysioSign, Inc. The Saah ECG machine not only records the P-QRS-T waves but also the microwavelets during the PR interval. The authors of this study were able to divide the PR interval into three intervals namely PAs, AHs, and HVs (see figure 3 of the article).

By using new technology in ECG measurements they were able to record (i) three to six wavelets before the P-wave, (ii) four to six wavelets before the QRS complex of which two to four overlapped in P-waves and in the terminal of P-waves, (iii) four to seven wavelets in the ST segment and upstroke of T-wave with decreasing amplitude were recorded (see figure 4 of the article). The above mentioned theoretical considerations are reflected in the measurements shown in the paper, which set out to be the normal limits of the duration. The authors have also compared and validated their new microwavelet values with the existing intracardiac measurements available in the literature (see Table 1 & figure 5 of the article), which seem to be well within the normal range of clinical values.

Moreover, the authors also provide the clinical significance of their work by performing a study on arrhythmias of supraventricular origin and found characteristic wavelets before the QRS complex similar to sinus rhythm subjects. Furthermore, in patients with AV block, they observed that a similar characteristic waveform before the QRS complex contributed to the location of the AV block. It therefore remains to be seen whether the new ECG system will be of value in the assessment of atrial arrhythmias and AV block patients with the presence of microwavelets in PR the segment and whether it might be able to lead to any clinical significance.

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