

P-wave Indices to Detect Susceptibility to Atrial Fibrillation

Aline Cabasson, Lam Dang, Jean-Marc Vesin, Andréa Buttu*, Roger Abacherli, Remo Leber and Lukas Kappenberger

EPFL

Lausanne, Switzerland

Improving detection of Atrial Fibrillation (AF) susceptibility in order to prevent complications presents a significant clinical interest. The aim of this work is to present different markers resulting from the analysis of a single ECG lead recorded during sinus rhythm. To this purpose, the ECGs from three populations were compared: healthy subjects (30 in Group 1) and patients subject to paroxysmal AF selected for catheter ablation, under general anesthesia (20 in Group 2), or not (8 in Group 3). In addition to standard P-wave indices such as P-wave duration, PQ interval, an index of P-wave stability over time defined as the Euclidean distance between beat-to-beat P waves was proposed. In parallel to these temporal P-wave parameters, morphologic characteristics of biphasic P-wave were studied. Significant differences between the groups 1 and 2 were obtained for the considered parameters ($p < 0.0001$). Results are presented in table below. Using P-wave duration and PQ interval parameters, the groups 1 and 2 were well classified at 88% using Fisher's linear discriminant. The variance of the beat-to-beat Euclidean distance (noted VarED), a measure of P-wave time stability, was higher for the group 2 and 3 than for the control group. This may be indicative of intermittently disturbed conduction in atrial tissue. In parallel, the analysis revealed that there are not significant differences on parameters between the groups 2 and 3. We therefore concluded that the anesthesia does not influence the investigated parameters. The study of the morphologic characteristics of biphasic P-waves revealed significant difference between the groups 1 and 2 considering the P-wave initial force (1.4 ± 0.5 vs. 5.1 ± 1.8 mVxms) and the terminal force (-1.1 ± 0.5 vs. -2.3 ± 1.1 mVxms). In conclusion, this study provides valuable markers for the early recognition of patients at high risk for AF which may guide upstream therapy.