

An Innovative Approach to ECG Ventricular Activity Suppression in Persistent Supraventricular Tachycardia

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Introduction. Supraventricular tachycardia (SVT) is a common arrhythmia impacting the heart upper chambers and can cause symptoms like palpitations and dizziness, potentially leading to clot formation. Diagnosis involves an ECG to visualize the P-wave, which is straightforward in sinus rhythm but challenging during tachycardia due to QRS-T waves masking the P-wave. Unmasking the P-wave typically requires signal analysis to cancel out the QRS-T waves.

Materials and methods. The dataset, collected from Hospital Clínico Universitario Virgen de la Arrixaca arrhythmia unit, includes six SVT studies and all related signals. These records, carefully selected by experts, cover various SVT types, such as orthodromic tachycardias (where the P wave is outside the QRS complex) and intranodal tachycardia (where the P wave overlaps with the QRS complex). Our method involves creating a high-quality template from the sinus rhythm, which is then subtracted from the tachycardia signal to extract the P-wave.

Experiments and results. Our experiments focused on the effectiveness of cancelling the QRS complex, with or without the T-wave. An expert clinician compared P-wave visualizations before and after processing. In cases of T-wave cancellation, we used the Framingham QTc formula for template shape correction. The outcome was an improvement in visual detection in 66.7% of the cases.

Conclusions. The algorithm developed in this study introduces a groundbreaking processing method that cancels the QRS-T waves, taking into consideration the QTc value. This advancement is particularly significant when the morphology and location of the P-wave are essential for an accurate diagnosis.

