Telemedicine assisted Secondary Prevention with Individual Forecasting based on ECG Monitoring

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The aim of our study was to apply complex methods (correlation dimension (CD or named D2) and Classification and Regression Trees (CART) analysis) for the individual forecasting of ventricular tachycardia (VT) and death in telemedicine setting during the cardiac rehabilitation of postinfarction patients. Eighty-eight postinfarction patients were monitored monthly with our mobile, 24 hour, one-channel ECG equipment with a store-and-forward technique. In case of lowering the CD under the cut-off value, an immediate medical visit was performed. In the same patient group, the predictive accuracy of time-frequency HRV variables for ventricular tachycardia (VT), wavelet (W) decomposition parameters from level 2 (W2) to level 256 (W256)) obtained from nocturnal ECG monitoring were analyzed. The Daubechies-4 W transform was used. For each record, the W coefficients were calculated on sets of 512 RR intervals, giving eight separate levels of analysis named W2, W4, W8, W16, W32, W64, W128 and W256. The variability power, level by level, was calculated as the sum of squares of the coefficients. Using ROC curves analysis, the best variable was W32 (W 0.799, $p<0.0001$), followed by W16 (W 0.722, $p<0.0001$). The CART methodology generated a decision tree for VT prediction including all levels of W coefficients, from W2 to W256 with a sensitivity reaching 84.5% and a specificity of 91.9%. During the 5 years follow-up 88 patients (age: 67,4$\pm$9.4, M/F: 48/40, ejection fraction $>$0.35) with Telemedicine Management (TM+), and 94 age-matched postinfarction control group (age: 65,1$\pm$8.3 M/F: 50/44, ejection fraction $>$0.35) without Telemedicine Management (TM-), were studied. 9 deaths in the TM+, and 21 in the TM- group were observed ($p<0.01$). The sensitivity, specificity, positive and negative predictive accuracy of the CD values was 66.4, 79.5, 64.1, 83.7%. The CD cut-off value of 1.9 showed significant difference ($<$ 0,001) by the Kaplan-Meier survival curves.