Nonhyperemic Intracoronary Pressure Waveform Analysis Predicts the Fractional Flow Reserve

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It has been regarded that the nonhyperemic resting pressure ratio (RPR) was not appropriate for exact evaluation of the functional severity of coronary lesion. However, some studies suggest that the comparison of the proximal and distal resting waveform of the stenosis may predict the fractional flow reserve (FFR), because the intracoronary waveform has such a high-frequency pressure signal at the closing of aortic valve (notch) that can be decreased by the filter-effect of the stenosis. Deriving the resting pressure waveforms, an attempt was made to identify such a nonhyperemic parameter that correlated directly with the severity of coronary artery stenosis. We studied 22 patients (age: 61+10.2 years. On 31stenosed vessels (15 LAD, 2 LCx, 11 RCA, 2 I. diagonal, 1 OM) 40 pressure measurements were carried out by PressureWire Certus (Radi Medical) (9 times after PCI). The pressure curves were exported through the RadiView software to a JAVA program developed by us and the dp/dt were calculated (dt=1/100 sec). In order to characterize the ascending slope of the dicrotic notch, the difference between the local minimum and maximum values of the derivated pressure waveform was calculated (derivated delta notch: delta dpN/dt). There was a significant correlation between the delta dpN/dt and FFR, as well as the RPR and the FFR ($r= 0.59$, $p <0.001$ and $r= 0.65$, $p= 0.004$, respectively). By using the Receiver Operating Curve (ROC) analysis, the value of 3>delta dpN/dt (sensitivity 100%, specificity 91%), and an RPR=0.87 (sensitivity 88%, specificity 84%), was found to be the optimal cut-off values for predicting FFR<0.75. The area under the ROC was 0.99 in case of delta dpN/dt and 0.92 in case of RPR. The delta dpN/dt can be a new useful nonhyperemic parameter for the assessment of the coronary artery stenosis during the intracoronary pressure measurements.