Comparison of the Data Derived from Three-dimensional Reconstruction of Coronary Angiography and the Fractional Flow Reserve Measurements

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The measurement of the fractional flow reserve (FFR) of intermediate coronary lesions is reasonable because the uncertainty of the hemodynamic information of the conventional coronary angiography. Our aim was to compare the data calculated from the 3D reconstruction of a given stenosis with the FFR values measured on the same coronary segment. 22 patients (age : 61 ± 9.73 years) were evaluated by the IC30 software of the Axiom Artis X-ray machine. 3D reconstruction was successfully carried out on 23 coronary arteries (14 LAD, 4 CX, 5 RCA). Regression analysis demonstrated significant relationship between the cross-sectional area percentage stenosis (AS) calculated based on the 3D measurement and the FFR (r : -0.566, p: 0.008), as well as between the 3 D derived plaque volume(PV) and the FFR (r : -0.501, p: 0.018). On the other hand, the diameter stenosis (DS) and the mean lumen diameter (MLD) did not correlate with the FFR values. The correlation between the 3 D derived MLA and the FFR did not reach the significant level, either. According to the Receiver Operating Characteristic (ROC) analysis the rank of the areas under the ROC curves (AUC) were the following: 1. PV (0.76), 2. AS (0.74), 3. DS (0.62), 4. MLA (0.55), 5. MLD (0.51).The difference between the AUC of the PV and MLA was found to be significant (p=0.02). The best agreement with the FFR was found when the PV was $> 44\%$ (sensitivity 66.67 %, specificity 82.35) and the 3D AS was $>60\%$ (sensitivity 100%, specificity 47 %). Quantification of the intermediate coronary artery stenoses in 3D provides more precise evaluation of the hemodynamic significance. In our opinion beside the 3D AS, the calculated PV characterizing the entire lesion is also an important predictor of the flow consequence of the stenosis.