

Influence of Heart Rate on Pressure Drop Coefficient and Fractional Flow Reserve for Epicardial Coronary Stenosis

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Background: Fluctuations in the heart rate (HR), contractility, and blood pressure are likely to occur during coronary catheterization procedures. For improved diagnosis of coronary circulation, the assessment methods should preferably be independent of these hemodynamic changes. This study evaluates the influence of HR on both fractional flow reserve (FFR) and an alternative diagnostic index, pressure drop coefficient (CDP_e). We hypothesize that CDP_e , assessed *in vivo*, is independent of HR. **Methods:** Simultaneous measurements of distal hyperemic coronary-arterial pressure drop (dp) and average peak flow velocity (APV) were performed on 11 pigs (44 ± 5 kg), using a dual sensor-tipped guide wire. Angioplasty balloons were used to create desired area stenosis (AS). The CDP_e was calculated as $(dp) / (0.5 * 1.05 * APV^2)$. To investigate the effect of HR on FFR and CDP_e , these indices were evaluated for “AS<50%” and “AS>50%”, during atrial pacing for HR<120 and HR>120 bpm. A total of 406 measurements were obtained. A two way repeated measure ANOVA was performed to determine if there is a difference in mean value of diagnostic parameter with AS and HR. **Results:** The mean values of FFR and CDP_e were not significantly ($p > 0.05$) different for variable HR conditions but were statistically different ($p < 0.05$) under variable AS condition; thus, distinguishing different degrees of epicardial stenoses. **Conclusion:** HR has insignificant influence on FFR and CDP_e for epicardial stenosis under normal microvascular conditions.

