CONCLUSIONS Nicorandil IC bolus injection is a simple, safe and effective way to induce maximal hyperemia and can be used as a substitute for adenosine.

CATEGORIES: IMAGING: FFR and Physiologic Lesion Assessment

KEYWORDS: Adenosine, Fractional flow reserve, Nicorandil

TCT-299

In Vivo Validation of Mathematically-derived Fractional Flow Reserve for Assessing Hemodynamics of Coronary Tandem Lesions

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BACKGROUND The aim of this study was to provide and validate a mathematical model of tandem lesion for the prediction of post-stenting fractional flow reserve (FFR) across the remaining stenosis without a repeated FFR measurement.

METHODS Following treatment of either proximal or distal stenosis, the residual FFR gradient across the remaining lesion (FFR',d,post or ΔFFR,post) was calculated as ΔFFR,post / (1-wΔFFR,post) or ΔFFR,post/(1-kw−ΔFFR,post), respectively. Considering ΔFFR,proximal (ΔFFR across the proximal segment to the proximal stenosis), the predicted FFR,d was [1−ΔFFR,proximal−ΔFFR,post]. For in vivo validation, twenty patients with a tandem lesion (DS-50% for each stenosis) were evaluated. After stenting a stenosis with a larger ΔFFR,d, post-stenting FFR,d was re-measured and compared with the calculated FFR',d,post. The accuracy was also compared with a previous model that did not consider a side branch flow.

RESULTS FFR',d,post using our model (vs. previous model) showed a closer correlation with the measured FFR,d (R²=0.89 vs 0.80) and a greater prediction power in terms of mean absolute error (0.03 vs 0.04, respectively). (Figure A and B). When ΔFFR gradients across proximal and distal stenosis were equal (ΔFFR,proximal−ΔFFR,post), prioritizing treatment of distal (vs. proximal) stenosis was more effective to reduce the residual FFR gradient (Figure C). Especially in tandem lesions with a big side branch and a large sum of ΔFFR,d and ΔFFR,post, even with a slightly larger ΔFFR,d (vs. ΔFFR,post), consequent FFR recovery was less effective compared to distal stenosis treatment (‘disagreement zone’ in Figure D).

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Adenosine Versus Regadenoson In Assessing Fractional Flow Reserve, A Meta Analysis

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BACKGROUND Fractional Flow Reserve (FFR) has become the standard method of assessing the physiological severity of intermediate coronary artery stenosis. It requires maximum hyperemia. Traditionally Adenosine has been used. Regadenoson, a selective A2A receptor agonist, is an approved hyperemic agent for pharmacological stress imaging, its role for measuring FFR is unknown. We therefore systematically reviewed published literature to compare the efficacy and safety between these two drugs in measuring FFR.

METHODS We searched PubMed, Cochrane Library & Web of Science for randomized controlled trials (RCT) comparing the use of Adenosine versus Regadenoson in measuring FFR. The primary endpoint was the correlation of FFR values using those two drugs. We also assessed the change in mean blood pressure, heart rate, and development of advanced heart block as safety outcomes. Odds ratio and 95% confidence intervals were used to evaluate categorical variables. Standard difference in the mean and 95% confidence intervals were used to evaluate continuous variables. All the analysis was done with the Der Simonian and Laird random effect model. Sensitivity and cumulative analysis were performed for each outcome.

RESULTS A total of 4 RCT with a total of 202 patients were included. Each patient underwent FFR measurement using IV Adenosine first then with IV Regadenoson. A strong linear correlation of FFR was noted in between the two methods. The pooled mean correlation factor was R=0.981. There was no statistically significant difference in mean FFR values between both groups (Smd -0.07, CI = [-1.08; -0.09], P=0.07). The standard mean difference was lower with sensitivity analysis but remained statistically insignificant (Sdm -0.008, CI = [-0.21;1.29], P=0.94). Change in heart rate were less in Adenosine arm...
RESULTS Pd/Pa correlated more strongly with CFR than FFR (vessels (135 patients) with thermodilution-derived measurements; and form there, 2) to investigate the potential value of Regadenoson is effective in measuring FFR. It is associated with less high degree AV block. Large RCT are needed to further demonstrate the clinical outcomes and cost effectiveness of it. Its use in complex multiple lesions needing serial FFR measurements is to be studied.

CATEGORIES IMAGING: FFR and Physiologic Lesion Assessment

TCT-301 Lesion-specific myocardial mass: A new index for diagnosis and treatment of coronary artery disease
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BACKGROUND Accurate quantification of the myocardial mass by coronary computed tomography angiography (CCTA) has become available. And lesion-specific myocardial mass (LMM) could be estimated with clinical applications of allometric scaling law. The aim of this study was to estimate the influence of the amount of lesion-specific myocardial mass (LMM) on the diagnostic performance of % DS or MLD to predict functional ischemia defined as fractional flow reserve (FFR) < 0.80.

METHODS CCTA and FFR were performed to evaluate 208 lesions in 132 patients. Index of myocardial ischemia was defined as FFR < 0.80. Total 211 lesion-specific myocardial mass was estimated using CCTA measurements based on allometric scaling method. And the LMM was defined as each myocardial mass per each supply vessel. Bivariate analysis was performed to estimate correlation between FFR and %DS of MLD in accordance with the amount of LMM.

RESULTS Ischemia was observed in 102 lesions. The mean FFR value was 0.63 ± 0.13. Mean total myocardial mass of CCTA was 108.20 (g) and mean LMM was 36.51 (g). Lesions with positive FFR had larger mean LMM. %DS and FFR showed modest negative correlation with high sensitivity but low specificity was observed. At the same anatomical severity of stenosis, lesions with larger LMM tend to produce more functionally significant ischemia. Interestingly, this tendency was not observed according to the reference diameter. At the same MLD, functionally significant ischemia was produced at lesions with larger LMM. Further, based on these slope of regression lines, lesions can be divided into 2 groups according to FFR value. So we assumed that, lesions with larger LMM and/or smaller MLD will produce more significant functional ischemia. We made new index with LMM divided by MLD and assessed its diagnostic performance to predict functionally significant ischemia. With the best cut-off value of 0.80 for FFR, the AUC of the ROC were 0.82 with 62% of sensitivity and 90% of specificity. And the diagnostic performance of LMM/MLD was higher than that of % DS.

CONCLUSIONS Lesion-specific myocardial mass (LMM) can be calculated from CT by allometric scaling law. The larger the amount of lesion, the better the correlation between FFR and MLD was observed in this study. LMM showed weak correlation with RD and weak negative correlation with %DS. A new index, LMM/MLD was predictive for ischemia as well as LS%/FFR < 0.8. Our study suggests that LMM significantly correlates with % DS or MLD and LMM/MLD can be used to predict functionally significant ischemia. With the best cut-off value of 0.80 for FFR, the AUC of the ROC were 0.82 with 62% of sensitivity and 90% of specificity. And the diagnostic performance of LMM/MLD was higher than that of % DS.

CATEGORIES IMAGING: FFR and Physiologic Lesion Assessment

TCT-302 Comparison Between Thermodilution And Doppler Flow Velocity Derived Quantification Of Microvascular Function After Acute Myocardial Infarction
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BACKGROUND The prognostic value of the quantification of coronary microvascular function following an acute myocardial infarction is becoming increasingly acknowledged. Invasive interrogation of coronary microvascular function can be performed using either a thermamplification based technique to quantify coronary blood flow or Doppler flow to assess coronary flow velocity. For the contemporary