Per-vessel analysis	Overall	Group 1 (Low IMR)	Group 2 (High IMR)
Vessels, %	300	217 (72)	83 (28)
Mean FFR (SD)	0.80±0.11	0.80±0.11	0.81±0.11
Median IMR (IQR)	17 (12-24)	15 (11-17)	29 (26-37)
Concordance in stenosis severity classification, % *p<0.001 for comparison Group 1 vs. 2	261 (87)	198 (91)	63 (76)
Area under the receiver operating characteristic curve (AUC) (CI 95%) *p <0.05 Group 1 vs. 2	0.93 (0.90-0.96)	0.96 (0.92-0.98)	0.88 (0.79-0.94)
Sensitivity, %	88	89	74
Specificity, %	86	93	89
Likelihood ratio (+)	6.29	12.71	6.72
Likelihood ratio (-)	0.13	0.11	0.29

CONCLUSION The diagnostic performance of QFR is significantly lower in vessels with microcirculatory dysfunction. Although the impact on overall diagnostic performance is moderate, future corrective measures might improve the applicability of QFR in patients with suspected microvascular involvement.

CATEGORIES IMAGING: FFR and Physiologic Lesion Assessment

TCT-71

Influence of Local Myocardial Damage on Index of Microcirculatory Resistance and Fractional Flow Reserve in Target and Non-target Vascular Territories in a Porcine Microvascular Injury Model

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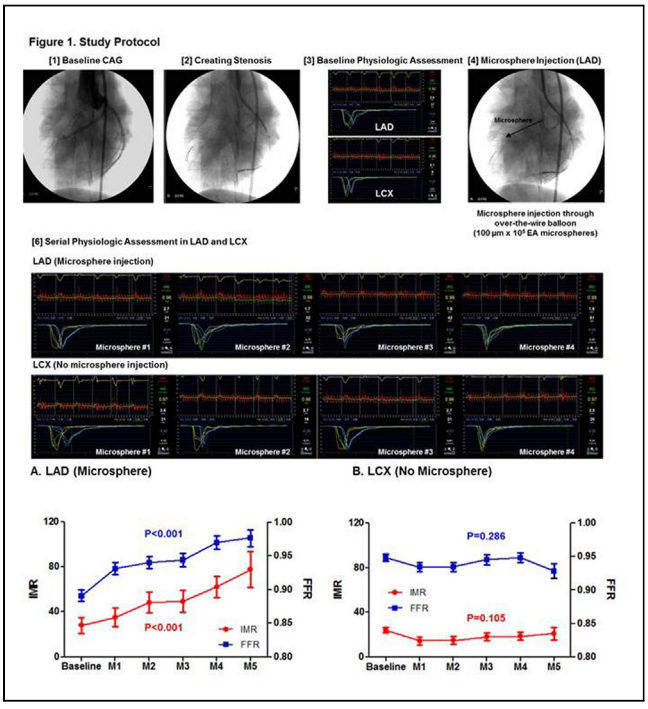
BACKGROUND Although fractional flow reserve (FFR)-guided decision-making for the non-culprit stenosis in patients with acute myocardial infarction (AMI) has been reported to be better than angiography-guided revascularization, there have been debates regarding the influence of microvascular dysfunction on measured FFR in non-culprit vessels. The aim of this study was to investigate the influence of microvascular damage in one vessel territory on invasively measured physiologic parameters in the other vessel, using a porcine microvascular damage model.

METHODS In Yorkshire swine, microvascular damage was induced with selective intracoronary injection of microspheres into the left anterior descending artery (LAD). Coronary stenosis was created in both LAD and left circumflex artery (LCX) using balloon catheters. Coronary physiologic changes were assessed with index of microcirculatory resistance (IMR) and FFR at baseline and at each subsequent injection of microsphere up to 5th dose in both LAD and LCX. Measurement was repeated 5 times at each stage and a total of 424 measurements were made in 12 Yorkshire swine models.

RESULTS The median area stenosis in LAD and LCX were 48.1% (Q1-Q3 40.8-50.4) and 47.9% (Q1-Q3 31.1-62.9), respectively. At baseline, FFR in LAD was lower than that in the LCX (0.89±0.01 and 0.94±0.01, p<0.001). There was no difference in IMR (18.4±5.8U and 17.9±1.2U, p=0.847). With repeated injections of microsphere, IMR in LAD was significantly increased, up to 77.7±15.7U (p<0.001). Given the same stenosis, FFR in LAD was also significantly increased, up to 0.98±0.01 along with IMR increase (p<0.001). Conversely, IMR and FFR were not changed in the LCX throughout repeated injury to the LAD territory (p=0.105 and p=0.286 for IMR and FFR, respectively). The increase in LAD IMR was mainly driven by the increase in hyperemic mean transit time (p<0.001).



CONCLUSION In Yorkshire swine models, local microvascular damage increased both FFR and IMR in a vessel supplying target myocardial territory. However, IMR and FFR were maintained in the other vessel. These results support the use of FFR-guided strategy for non-culprit lesions in patients with AMI.

CATEGORIES IMAGING: FFR and Physiologic Lesion Assessment

TCT-72

Computational fractional flow reserve derived from three-dimensional intravascular ultrasound: a new algorithm of fusion between anatomy and physiology

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BACKGROUND Fractional flow reserve (FFR) and intravascular ultrasound (IVUS) imaging, respectively, are considered as the "gold standard" for functional and anatomical assessments of angiographic intermediate stenoses. Associating both in a single method could optimize diagnosis and treatment of coronary artery disease.

METHODS We enrolled patients with suspected chronic coronary disease who underwent IVUS and FFR evaluation by clinical indication. Three-dimensional coronary models were obtained from the integration between IVUS images and the spatial location of the IVUS catheter through fluoroscopy. Computational fluid dynamics was applied, introducing a new strategy to estimate computational FFR from three-dimensional IVUS (FFRIVUS). The performance of FFRIVUS in patients with intermediate stenoses was evaluated using conventional FFR with a pressure guidewire (FFRPW) as reference.

RESULTS FFRIVUS was estimated in 34 arteries of 24 patients with intermediate lesions. The mean minimum luminal area evaluated by IVUS (MLAIVUS) was 4.14 ± 1.74 mm2, with mean plaque burden of 66 ± 10%. There was a significant correlation between the FFRIVUS and FFRPW (r = 0.79, p <0.01), with a mean difference of -0.008 ± 0.067. Considering FFR ≤ 0.80 as indicative of ischemia, the accuracy, sensitivity, specificity, positive and negative predictive values were