

# Clinical relevance and prognostic implications of contrast quantitative flow ratio in patients with coronary artery disease

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## Background

This multicenter, observational study at 5 centers in Korea sought to evaluate the diagnostic performance of contrast quantitative flow ratio (cQFR) as well as comparing vessel-oriented composite outcomes (VOCO) in an all-comer patient population with CAD, to assess the wider applicability of QFR regardless of clinical presentation.

## What this study adds

Previous studies evaluating the diagnostic performance QFR compared to FFR mostly evaluated patients with stable ischemic heart disease and intermediate lesions. This study evaluated contrast as well as fixed QFR an all-comer patient population, which included diabetes mellitus, acute coronary syndrome, and previous MI.

## Methods

- A total of 452 consecutive patients and 599 vessels that underwent clinically-indicated FFR and cQFR measurements were evaluated from 2016-2018.
  - Full evaluation included anatomic parameters visually by angiography such as diameter stenosis, area stenosis by QCA, a fixed QFR calculation based on a fixed hyperemic flow velocity, and cQFR.
  - cQFR in this study was derived from 3D QCA with TIMI frame counts and compared with invasive FFR and resting Pd/Pa using a pressure wire (Abbott Vascular).
- The primary endpoint was the diagnostic accuracy of cQFR to predict an FFR of  $\leq 0.80$ .
- The secondary endpoint was to evaluate VOCO (composite of cardiac death, target-vessel MI, and ischemia-driven target lesion revascularization) based on cQFR and FFR values.

## Results

- Patient and lesion characteristics showed a broad range of clinical presentations, including 25.9% of patients with ACS.
- cQFR showed significant correlation ( $r=0.860$ ,  $p<0.001$ ) and agreement (mean difference 0.002, 95% CI) with FFR.
- cQFR showed excellent diagnostic accuracy of **91.2%** to predict a clinically significant FFR of  $\leq 0.80$ , even among varied patient or lesion characteristics.
  - High positive and negative likelihood ratios of cQFR suggest that QFR is *highly effective* to predict a functionally significant stenosis (FFR  $\leq 0.80$ ).
- Vessels with low cQFR ( $\leq 0.80$ ) were associated with a significantly higher risk of VOCO than those with a high cQFR (4.2% vs. 0.9%,  $p=0.022$ ).
  - Low cQFR values were also associated with an increase in target-vessel MI and ischemia-driven TLR.
  - There was a significant association between cQFR and estimated risk of VOCO.

## Discussion

- These results support the clinical relevance and generalizability of cQFR assessment to evaluate functional significance regardless of clinical presentation, patient characteristics, or anatomical features.
- cQFR showed the best diagnostic performance for predicting functional significance when compared to anatomic parameters or resting physiology.
- The discriminatory ability of QFR to predict VOCO at 2 years was not significantly different than FFR.
- Results are in line with the post-hoc analysis of FAST-FFR<sup>1</sup>, which showed significantly higher agreement of angiography-derived FFR with invasive FFR than non-hyperemic pressure ratios.

## Limitations

Analysis of angiographic images were done post-hoc, and procedural clinical decision-making was based on the FFR results. As such, the study could not evaluate the full prognostic implications of QFR guidance. For a full list of study limitations, refer to the full publication.

## Conclusions

- cQFR showed excellent correlation and accuracy with FFR in various clinical settings and lesion characteristics.
- cQFR showed higher discrimination ability for  $FFR \leq 0.80$  than by anatomic parameters of stenosis severity or resting Pd/Pa.
- Low QFR was significantly associated with a higher risk of VOCO at 2 years compared with high QFR.
- cQFR may be a prognostic indicator and reasonable diagnostic tool in evaluating patients with coronary artery disease regardless of clinical presentation or characteristics.

## References:

1. W.F. Fearon, S. Achenbach, T. Engstrom, et al., Accuracy of fractional flow reserve derived from coronary angiography, *Circulation* 139 (2019) 477–484.