Agreement of vessel fractional flow reserve with established coronary physiology assessment tools

Dario Dilber[1,2]*,
Damir Avdagić[1],
Ivan Rosović[1]

[1]Thalassotherapia Opatija, Opatija, Croatia
[2]University of Rijeka, School of Medicine, Rijeka, Croatia

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***ADDRESS FOR CORRESPONDENCE:** Dario Dilber, Thalassotherapia Opatija, Ul. Maršala Tita 188, HR-51410 Opatija, Croatia. / Phone: +385-91-4683-101 / E-mail: dario.dilber@gmail.com

ORCID: Dario Dilber, https://orcid.org/0000-0002-0062-4708 • Damir Avdagić, https://orcid.org/0009-0007-3834-5724
Ivan Rosović, https://orcid.org/0000-0002-2340-3828

Introduction: The current gold standard for physiological assessment of intermediate coronary stenosis is fractional flow reserve (FFR)[1]. Despite its proven efficacy, FFR is clinically underused, so non-hyperemic instantaneous wave-free ratio (iFR) and non-invasive hyperemic stress cardiac magnetic resonance imaging (Stress CMR) are often used, despite their pitfalls. Angiography-based functional assessment of coronary stenoses is a novel approach to assess coronary physiology and data on quantitative flow ratio (QFR) are validated[1,2]. Vessel fractional flow reserve (vFFR) is computed using different fluid dynamics models (**Figure 1**) and studies on the diagnostic performance of vFFR are still warranted[3]. The present study investigated the agreement between vFFR and FFR/iFR, and Stress CMR.

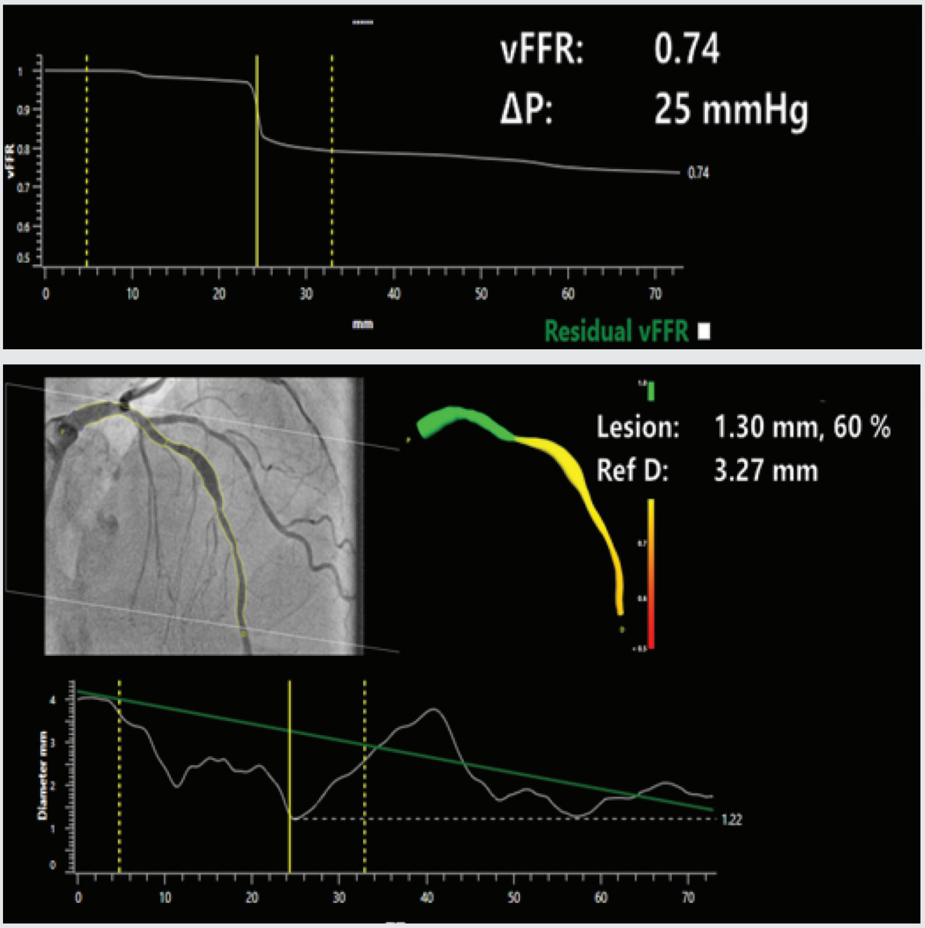

FIGURE 1. Illustration of a vessel fractional flow reserve (vFFR) analysis.

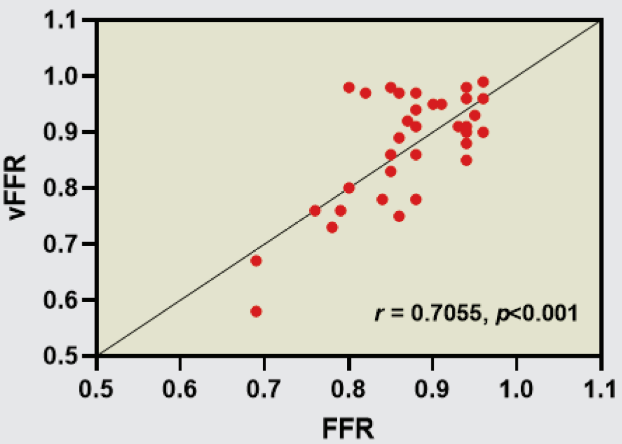

FIGURE 2. Pearson correlation (r) of agreement of vessel fractional flow reserve (vFFR) versus fractional flow reserve (FFR).

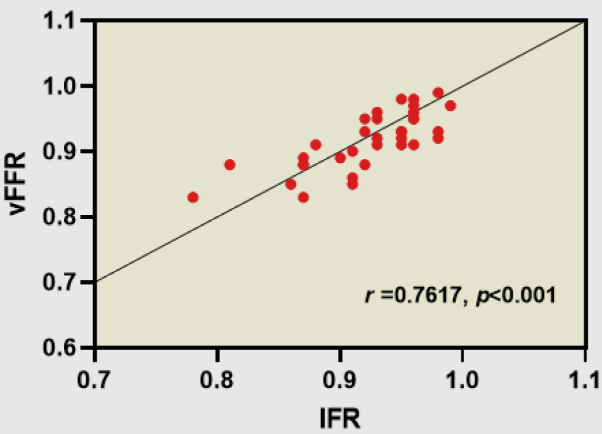

FIGURE 3. Pearson correlation (r) of agreement of vessel fractional flow reserve (vFFR) versus instantaneous flow reserve (iFR).

Patients and Methods: All-comers with intermediate coronary stenosis, excluding ST-elevation myocardial infarction patients, were assigned either to invasive coronary wire-based functional assessment (FFR, iFR or both) or to stress CMR. In cases when both FFR and iFR values were obtained in a single vessel, only FFR values were taken and compared to vFFR values accordingly. Coronary lesions involving ostium, left main artery or myocardial bridge were excluded. vFFR analysis was performed retrospectively based on aortic root pressure and two angiographic projections with exclusion of patients with no appropriate two angiographic projections or poor image quality.

Results: Total of 94 patients with 102 intermediate lesions were included in the study. The mean age of patients was 65.3 ± 10,8 years, 71.4% were male, and 86.2% presented with the chronic coronary syndrome. The majority of physiology assessment was performed in the left anterior descending artery (56.9%). The value of the Pearson correlation coefficient indicates a very good and positive correlation of vFFR vs FFR ($r = 0.7055$, $p < 0.001$) (**Figure 2**) and vFFR and iFR ($r = 0.7617$, $p < 0.001$) (**Figure 3**), and a moderate and positive correlation of Stress CMR vs vFFR ($r = 0.5485$, $p < 0.001$).

Conclusion: Angiography-based vFFR has a substantial agreement with invasive wire-based hyperemic FFR and non-hyperemic iFR, and only moderate with Stress CMR in assessment of ischemia in patients with intermediate coronary stenosis.

LITERATURE

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