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Authors: Masanaga Tsujimoto, M.D; Yoshiaki Kazwase, M.D; Makoto Kadotani, M.D, PhD; Yoshio Ohnishi, M.D, PhD

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Relationship between fractional flow reserve value and the amount of subtended myocardium

Short title: FFR and myocardial mass

Masanaga Tsujimoto[1], M.D; Yoshiaki Kazwase[2], M.D; Makoto Kadotani[1], M.D, PhD; Yoshio Ohnishi[1], M.D, PhD

1) Department of Cardiovascular Medicine, Kakogawa Central City Hospital, Japan
2) Department of Cardiovascular Medicine, Gifu Heart Center, Japan

Classifications: Stable angina, Chronic coronary total occlusion, Fractional flow reserve

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A 68-year-old man with exertional angina was admitted to our hospital. Coronary angiography revealed a moderate stenosis in the mid right coronary artery (RCA) and an occluded atrioventricular (AV) branch with Rentrop grade 2 collaterals providing retrograde flow from the posterior descending (PD) branch (Panel A). A pressure wire (Opto Wire; Opsense, Quebec, Canada) was advanced to the PD branch. The fractional flow reserve (FFR) measurement was 0.86 and the diastolic pressure ratio (dPR) was 0.98 (Panel B and C).

The occluded AV branch was crossed with a wire and stented (Panel D). The FFR measurement after stenting was 0.73 (Panel E), which indicated the presence of ischemia caused by the mid RCA lesion. Therefore, the lesion was stented. The final FFR and dPR measurements were 0.94 and 1.02, respectively (Panel G-I).

This is a representative case to show the relationship between the severity of the stenosis and the coronary flow velocity across the stenosis. The amount of subtended myocardium directly relates to the coronary flow demand. [1] This case also illustrates that the perfusion of a collateral-dependent territory is inferior to that of the same territory perfused by a patent artery. In addition, the dPR value calculated from resting Pd/Pa data after stenting of the AV branch was 0.98 (Panel F), which means that dPR could not detect the change of the subtended myocardium as sensitively as FFR.

Several reports have shown higher FFR in the collateral donor vessel after CTO lesion recanalization. [2] In these cases, contrary to ours, after CTO recanalization, the amount of blood supplied to the myocardium by the donor vessel was reduced and the hemodynamic significance of the stenosis in the donor vessel decreased.

These are illustrative cases of FFR dynamically reflecting the change in the amount of subtended myocardium due to stenosis.

Figure legend: The transition of the physiological parameters throughout the procedures. Baseline coronary angiogram (A), fractional flow reserve (B), and diastolic pressure ratio (C).

Post atrioventricular (AV) branch intervention coronary angiogram (D), fractional flow reserve (E), and diastolic pressure ratio (F).

Final coronary angiogram (G), fractional flow reserve (H), and diastolic pressure ratio (I)

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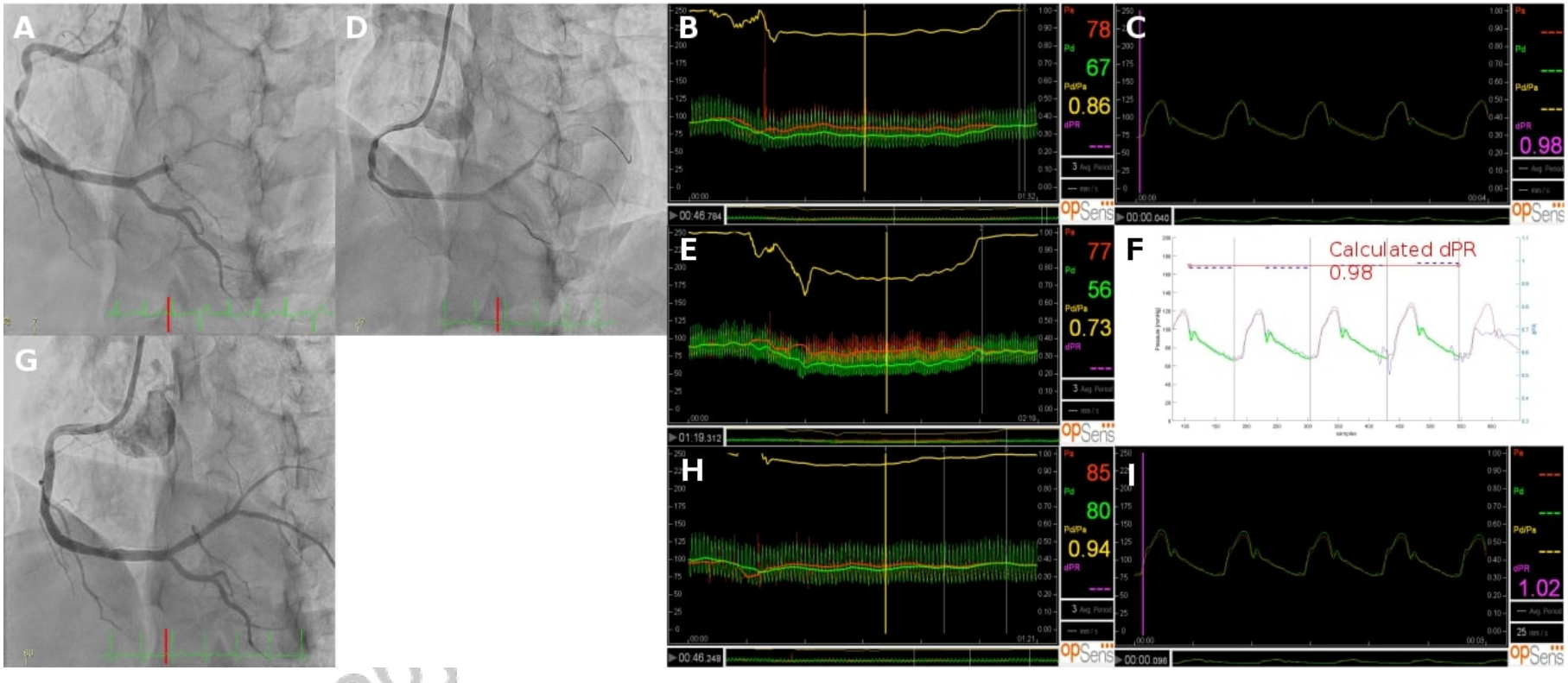
A
D
B
78
67
Pd/Pa
0.86
dPR
C
0.98
G
E
77
56
0.73
F
Calculated dPR
0.98
H
85
80
0.94
I
1.02
opSens