EVALUATION OF VARIABILITY OF FFR MEASUREMENTS DURING A SINGLE READING PERIOD USING INTRAVENOUS ADENOSINE-INDUCED HYPEREMIA

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Background: Fractional Flow Reserve (FFR) is accepted as an in-lab index of coronary stenosis severity using the translesional pressure ratio (Pd/Pa) during maximal hyperemia. Clinical decisions for revascularization can be complicated by variability of Pd/Pa recordings. We evaluated the variability of Pd/Pa during single recording periods made with intravenous adenosine-induced hyperemia.

Methods: We examined consecutive FFR tracings with continuous adenosine infusion (140 micrograms/mg/min by peripheral IV). Tracings were included if pressures were recorded for at least 150 seconds and at least 30 seconds after the lowest FFR reading. The lowest recorded FFR value was assumed to be the point of maximal hyperemia. The highest Pd/Pa reading during the remaining period of the adenosine infusion was recorded. FFR tracings were categorized as significantly variable if the Pd/Pa moved from below to above the 0.80 threshold value.

Results: Of 73 tracings meeting the inclusion criteria, 4 were excluded due to evidence of wire pullback or guide dampening. The mean FFR at maximal hyperemia was 0.80 +/- 0.10 for the 69 tracings (range: 0.56-0.99). The mean increase in Pd/Pa was 0.10 +/- 0.07 (13% +/-10%, range: 1-51%). Pd/Pa values changed from below to above 0.80 with at least a 0.03 unit change in 22 patients, representing 32% of the sample. Similar but less pronounced variability was found with a 3-beat average FFR. Reported FFR value increases were mainly due to Pd rising more than Pa following maximal hyperemia, with a minority due to Pa falling relative to Pd. Several tracings demonstrated both a phasic rise and subsequent fall in Pd/Pa after maximal hyperemia.

Conclusions: FFR is a valuable clinical tool, but variability in Pd/Pa measurements during extended adenosine infusion is common. Despite presumed steady state levels of adenosine, the observed variability of Pd/Pa measurements may reflect dynamic physiologic responses to adenosine infusion. Using the lowest FFR (especially averaged over 3-beats) over the entire measurement period will eliminate clinical uncertainty.