Hyperemic hemodynamic characteristics of serial coronary lesions assessed by pressure pullbacks gradients (PPG) index

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Introduction: The evaluation of functional significance in serial coronary lesions is crucial for achieving optimal clinical outcomes. In this setting, fractional flow reserve (FFR) measurements with pullback pressure recording can be helpful in assessing lesion functional significance.
Purpose: To describe the functional characteristics of angiography-defined serial coronary lesions using FFR-derived motorised pullback tracings, and to describe the Pullback Pressure Gradients (PPG) index - in these lesions.
Methods: Prospective, multicentre study with independent core laboratory analysis. Patients undergoing coronary angiography due to stable angina were enrolled. Serial lesions were defined angiographically as the presence of 2 or more narrowings with visual diameter stenosis >50% separated at least by 3 times the reference vessel diameter in the same coronary vessel. Continuous IV adenosine-FFR measurements were obtained using a motorised device at a speed of 1 mm/s. Pullback curves were assessed to determine the presence of focal step-ups (FFR >0.05 units over 20 mm). In addition, the PPGindex was computed for all vessels. PPGindex values close to 0 define functional diffuse disease whereas values close to 1 define focal disease.
Results: From a total of 159 vessels (117 patients), 25 vessels were adjudicated as presenting serial lesions (mean PPGindex 0.48±0.17, range 0.26–0.87). Two focal pressure step-ups were observed in 40% of the cases (n=10; mean PPGindex 0.59±0.17), whereas 8% of the vessels presented a progressive pressure losses (n=2; mean PPGindex 0.27±0.01). In the remaining 52% of the cases, a single pressure step-up was recorded (n=13; mean PPGindex 0.44±0.12; ANOVA p-value = 0.01). The PPGindex independently predicted the presence of two focal pressure step ups.
Conclusion: Hyperemic FFR curves in tandem stenoses revealed high prevalence of functional diffuse CAD. Two pressure step-ups occurred in less than half of the vessels. High PPG-Index identified vessels with two focal pressure drops. FFR tracings and the PPGindex provide a more objective CAD evaluation, which can lead to changes in the therapeutic approach.