

Coronary physiology Update

Eric Eeckhout, MD, PhD, Cardiology Division CHUV, 1011 Lausanne, Switzerland

Coronary artery disease is a complex, multifactorial illness that may present as an acute coronary syndrome and/or chronic pathology progressing over years. In the diagnostic set up, anatomical evaluation is frequently necessary and coronary arteriography is currently still the gold standard. Adequate anatomical assessment of the severity of coronary disease in <<stable>> patients may be challenging. Visual (qualitative) assessment, although universally, the most common method, is characterized by an important inter-and intraobserver variability. Quantitative evaluation (computer algorithm) developed in the 70's has substantially reduced the aforementioned variability and became an essential tool for end point evaluation in interventional cardiology trials. Nevertheless, the clinical significance of intermediate lesions ($\pm 50\%$) can not adequately be determined by quantitative analysis. Intravascular ultrasound may provide important morphological information such as plaque composition and precise details on vessel size but again the technique is imprecise to reveal the significance of intermediate lesions. Functional or physiological lesion assessment implies the hemodynamic evaluation of a given epicardial lesion by intracoronary pressure and/of Doppler measurements.

The absolute coronary flow velocity reserve is defined as the blood velocity induced by maximal pharmacological microvascular vasodilation revised by the resting baseline velocity.

A value of < 2 has been correlated with a high specificity/sensibility with the documentation of reversible ischemia by noninvasive means. The myocardial fractional flow reserve is that proportion of the normal flow (in the absence of a lesion) that can be maintained despite the presence of a given lesion. A value of 0.75 (or 75% of normal flow) has been correlated with the documentation of reversible ischemia by noninvasive testing, again with a high level of specificity/sensibility. Measurements are made with a high fidelity 0.014inch pressure or Doppler wire positioned distally to a given lesion after induction of maximal pharmacological microvascular vasodilation. Functional lesion assessment has become an essential tool in clinical decision making for patients with coronary artery disease.