

Determinants of slow flow in patients with normal coronary arteries

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Introduction: Reduced myocardial perfusion assessed during angiography has been shown to be a negative prognostic sign in patients with myocardial infarction. It has been attributed to various reasons such as: distal embolization, hyperviscosity, endothelial dysfunction, coronary spasm or inflammation. In order to evaluate the factors associated with slow flow, we recruited patients that had normal coronaries per angiography in order to exclude distal embolization as a cause of coronary slow flow. In this study, we evaluated the factors affecting coronary blood flow

Methods: We recruited 128 consecutive patients who underwent angiography due to unstable angina or non specific chest pain and were found to have normal coronaries per angiography. Each patient's angiogram was evaluated by 2 blinded specialists who graded the patients' TIMI frame count, TIMI flow grade and Clearance scores.

Results: Corrected TIMI Frame Count which evaluates epicardial blood flow and Clearance Rate Score which evaluates the microcirculation blood flow were highly correlated ($r=0.6$, $p=0.0001$). Their range was 14 fold (10-143 frames) with 50% of the patients with slow coronary blood flow. These correlations persisted in all the different coronary arteries supporting the assumption that slow flow is a systemic problem and not a local problem due to spasm of a specific artery. No correlation was found between coronary blood flow and different biomarkers of inflammation (CRP, WBC), rheology (fibrinogen), endothelial dysfunction (ICAM, VCAM, E-selectin), or metabolic parameters (HDL, LDL, triglycerides, HbA1c). Current smoking was the only determinant correlated with slow flow ($r=0.24$, $p=0.007$).

Conclusions: In patients with normal coronary arteries, coronary blood flow velocity is highly correlated between different blood vessels and the different measuring techniques. Slow flow is highly correlated to current smoking