

Significance of Velocities in the Left Main and Anterior Descending Coronary Arteries

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Internal elastic lamina is deficient at the transition zone between the main left (MLCA) and the left anterior descending (LAD) coronary arteries and may be related to hemodynamic alterations. At this transition zone, adaptive intimal eccentric thickening may develop and later may progress into more severe atheroma. Pressure gradient along the normal coronary artery is negligible. Considering the law of conservation of energy, as expected it was found that also the velocity gradient along the normal left anterior descending coronary artery (LAD) is negligible. Therefore, it is expected the main left coronary artery (MLCA) and LAD velocity difference is negligible.

Aim: Determine normal the velocity in the LAD and MLCA and evaluate clinical significance of MLCA-LAD velocity gradients.

Methods: First, normal velocities in the LAD were evaluated by trans-thoracic Doppler in 150 normal subjects. Next, trans-thoracic Doppler Sampling of MLCA and LAD velocities was performed in 62 subjects.

Results: LAD diastolic velocity in normal subjects was 34 ± 7 cm/sec. MLCA diastolic velocity was 80 ± 28 cm/sec higher than in the LAD, 51 ± 31 cm sec, $p < 0.000001$. Similarly, diastolic time velocity integral in the MLCA was significantly higher than in the LAD. In all subjects diastolic velocity was higher in MLAC than in the LAD, except in 4. In these 4 subjects, the diastolic velocity in the LAD was higher than that in MLCA and much higher than normal. Severe LAD stenosis was found in these subjects.

Conclusions: Transthoracic Doppler sampling of blood velocities in the MLCA and LAD is feasible. MLCA velocities and integrals are higher than those of the LAD, implying loss of kinetic energy and thus may be related to deficiency of internal elastic membrane at the MLCA-LAD transition zone. If higher LAD velocities are found, LAD stenosis should be considered.