Increased LAD Flow/Contraction Ratio is Required to Recover LV Contractility after Primary PCI

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In acute myocardial infarction (MI) primary angioplasty (PCI) is the treatment of choice; however, sub-optimal coronary flow results in suboptimal outcome. Aim: Quantify the coronary artery flow required after primary PCI to achieve recovery of left ventricular function. Methods: Trans-thoracic echocardiography (TTE) and sampling of velocities in the LAD were performed within 6 hours after PCI, 48 hours later and pre-discharge in 36 patients presenting with acute anterior MI. Correlations between LAD flow and left ventricular ejection fraction (LVEF) were performed to determine predictors of recovery of LVEF. Later, another group of 11 patients with suboptimal flow parameters predicting non-recoverability of LVEF were treated by intra-aortic balloon pump counter-pulsation (IABP) and had LAD flow and TTE evaluations performed. Results: Diastolic LAD flow immediately after PCI was 35±11ml/min, increased to 44±23 ml/min and pre-discharge 51±23 ml/min, $p<0.05$. Early (LAD flow)/(LVEF) ratio was significantly higher in subject in whom LVEF recovered compared to normal subjects and to those without LVEF recovery. In subjects with IABP diastolic LAD peak velocities of pumped beats, 73±28 cm/sec were higher than those of non-pumped beats, 34±11 cm/sec, $p=0.00075$. Diastolic LAD flows of pumped beats 60±47 ml/min were higher than without pumping, 28±19 ml/min, $p=0.05$ and (LAD flow)/LVEF significantly increased during pumping. Baseline LVEF in subjects with IABP 29.4±5.7% was less than that in those without pumping, 36.4±7%, $p=0.05$, while one week after angioplasty, LVEF in IABP patients increased to 34±7%. LVEF increased more than 5% in 55% of patients with IABP while only in 23% of those without, $p<0.05$. Conclusions: Diastolic flow in the LAD after primary PCI is not constant. In subjects with LVEF recovery, LAD flow is high with flow/LVEF mismatch. In subjects with suboptimal LAD flow, IABP increases coronary flow and results in flow/LVEF mismatch and recovery of LVEF.