Ejection fraction (EF), peak rapid filling rate (PFR), and peak atrial filling rate (PAF) were measured from left ventricular (LV) volume (V) curve and its dV/dt curve obtained from the ECG gated radionuclide ventriculogram constructed in a backward fashion from the R wave to the preceding R wave in 16 patients (Pts) with myocardial infarction (MI) and in 16 normal controls (N). Pts were divided into three groups according to EF; group A: 31 Pts with EF > 60%, group B: 31 Pts with 40% < EF < 60%, group C: 14 Pts with EF < 40%. EF was not significantly different in N and group A (68.5 ± 6.5% vs 66.5% ± 5.0%) but PAF was significantly lower in group A than in N (2.4 ± 0.9 vs 3.3 ± 0.7/sec, p < 0.01). PAF was significantly higher in group A and B than in N and group C (1.8 ± 0.9, 1.4 ± 0.6 vs 1.1 ± 0.5, 1.0 ± 0.5/sec, respectively, all p < 0.01). PFR showed close correlation with EF (r = 0.72, p < 0.01) in 66 Pts with MI. Conclusion: (1) PAF and PFR were more sensitive indexes in detecting myocardial damage. (2) LV early rapid filling was correlated to systolic performance. (3) Left atrial booster pump function compensated impaired LV filling in early diastole in mild LV failure, but there were no such compensation in severe LV failure.