Echocardiography: Systolic and Diastolic Function

Left ventricular and left atrial deformation imaging early after pPCI: does diabetes mellitus make any difference?

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More extensive coronary atherosclerosis in diabetes mellitu (DM) induces poorer clinical outcomes after STEMI, but there are data suggesting that impaired myocardial function in DM, even independently from epicardial coronary lesions severity, might have detrimental effect, predominately on heart failure development in DM.

Aim: the current study is a sub-study of PREDICT-VT study (NCT03263949), aimed to analyse LV and LA function using myocardial deformation imaging based on speckle tracking echocardiography after pPCI in STEMI patients with and without DM.

Methods: in 307 consecutive pts enrolled in PREDICT-VT study early echocardiography (5 ± 2 days after pPCI) was done including LA and multilayer LV deformation analysis with longitudinal (L), radial (R) and circumferential (C) strain (S; %) and strain rate (SR, 1/sec), LV index of post systolic shortening for longitudinal (PSS LS) and circumferential (PSS CS) strains and analysis of LV rotation mechanic.

Results: from 242 patients who completed 1 year follow up, 48 (20%) had DM. Pts with DM were older (60 ± 1,01 vs 57 ± 10; p = 0.067) and had insignificantly higher SYNTAX score (18.5 ± 9.2 vs 15.8 ± 9.8, p = 0.118) . However, diabetics had more severely impaired EF (44.2 ± 8.6 vs 49.2 ± 9.8, p = 0.001), E/A ratio (0.78 ± 0.33 vs 0.90 ± 0.34; p = 0.036) and MAPSE (1.18 ± 0.32 vs 1.32 ± 0.33; p = 0.001). Global LV LS on all layers (endo: -13.6 ± 4.0 vs-16.2 ± 4.7; mid: -11.9 ± 3.5 vs -14.1 ± 4.1; epi: -10.4 ± 3.1 vs -12.3 ± 3.6; p < 0.005 for all) was impaired in DM patients, as well as longitudinal systolic SR (-0.71 ± 0.23 vs -0.84 ± 0.24; p = 0.001) and SR during early diastole (0.65 ± 0.26 vs 0.83 ± 0.33, p < 0.001). Patients with DM had more pronounced longitudinal posts-systolic shortening throughout LV wall (endo: 21.4 ± 16.1 vs 13.7 ± 13.3, p = 0.005; mid: 21.9 ± 16.1 vs 14.3 ± 13.1, p = 0.006; epi: 22.4 ± 16.5 vs 15.3 ± 13.7, p = 0.010) and higher LV mechanical dispersion (MDI: 71.3 ± 38.3 vs 59.0 ± 18.9, p = 0.037). LA strain was significantly impaired in DM patients (18.9 ± 7.7 vs 22.6 ± 10.0, p = 0.011) and even more profoundly LA strain rate during early diastole (-0.73 ± 0.48 vs -1.00 ±0.58, p = 0.002). Patients with DM also had more impaired LV global (15.7 ± 9.1 vs 19.8 ± 10.4, p = 0.013) radial strain, global LV circumferencial strain, especially at the mid-wall level (-13.9 ± 4.2 vs -16.0 ± 4.3, p = 0.005) and impaired circumferential SR E (1.25± 0.44 vs 1.49 ± 0.46, p = 0.003). End-systolic rotation of the LV apex was more impaired in DM (4.7 ± 5.1 vs 6.8 ± 5.5, p= 0.022). During 1 year follow-up heart failure and all-cause mortality tend to be higher among DM pts (46.7% vs 35.2%, p = 0.153).

Conclusion: STEMI patients with DM have more severely impaired LV systolic and diastolic function estimated both by traditional parameter and advanced echo techniques. These results might, at least partially, explain why outcomes after STEMI in DM might be poorer, even in the absence of more complex angiographic findings, pointing to the significance of impaired myocardial function DM itself.