P2518 : Myocardial structural, perfusional and metabolic correlates of left bundle branch block mechanical derangements in patients with dilated cardiomyopathy

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Background: Left bundle branch block (LBBB) influences upon regional left ventricular (LV) structure, perfusion and metabolism were not thoroughly investigated in dilated cardiomyopathy (DCM) patients.

Methods: Eleven DCM patients with LBBB (69±11 years, LV ejection fraction[EF]: 35±8%) and 7 age- and LVEF-matched DMC patients without LBBB were studied by cardiac magnetic resonance (CMR) and positron emission tomography (PET). Left ventricle was divided in 3 regions: septum, adjacent (anterior/inferior) and lateral. Regional midwall circumferential strain, maximum shortening (εpeak) and strain rate were obtained from high-temporal resolution tagged CMR. Systolic stretch index (SSI) was calculated as positive strain rate (stretching) divided by total strain rate. Myocardial metabolic rate of glucose (MMRG), resting and hyperemic myocardial blood flow (MBF) were quantitated using 2-[18F]fluoro-2-deoxyglucose and [13N] ammonia PET, respectively.

Results: Conversely from non LBBB patients, LBBB patients showed highly inhomogeneous systolic deformation pattern which changed gradually moving from discoordinate [(SSI: 0.485 (0.284)] and poorly contracting (εpeak: -1.14±0.96%) septum to coordinate [SSI: 0.002 (0.168)] and strongly contracting (εpeak: -13.63±2.58%) lateral region (both P<0.0001). This pattern was closely matched to MMRG distribution disclosing lowest, intermediate and highest values respectively in the septum, adjacent and lateral region (0.19±0.09, 0.26±0.10, 0.34±0.15 μmol•min-1•g-1, respectively; P<0.0001). Septal-to-lateral thickness ratio was lower in LBBB than non LBBB patients (0.74±0.14 versus 1.00±0.08, P=0.03). In both groups, LV distribution of resting and hyperemic MBF and MBF reserve did not differ significantly.

Conclusion: In DCM patients, the extensive LV contraction abnormalities induced by LBBB caused regional myocardial metabolic and structural remodeling without consistent changes in blood flows. In particular the highly coordinate and vigorously contracting lateral region tends to hypertrophy and its metabolism shifts to near maximal glucose utilization, exhausting the metabolic reserve. The uncoordinated and poorly contracting septum tends to become thinner but preserves its metabolic reserve. These structural and metabolic regional changes are likely compensatory in short term, but may be detrimental in long run promoting adverse LV remodeling.