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RELATIONSHIP BETWEEN MYOCARDIAL PERFUSION INDICES AND MECHANICAL DYSSYNCHRONY BASED ON GATED SPECT PHASE ANALYSES IN PATIENTS WITH CORONARY ARTERY DISEASE AND HEART FAILURE

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Objective: Cardiac resynchronization therapy (CRT), in addition to optimal medical therapy, is an approved treatment for patients with coronary artery disease (CAD) and advanced heart failure (HF). Electrical dyssynchrony as determined by QRS duration is currently applied to select the patients for CRT; however, it may not necessarily represent mechanical dyssynchrony and therefore may not necessarily represent patient response to CRT. Some other factors may be related to the dyssynchrony of the left ventricle. The current study is designed to evaluate the relationship between mechanical dyssynchrony and some other factors such as CAD risk factors and myocardial perfusion indices.

Materials and Methods: One-hundred and three patients with angiographically proven CAD and heart failure entered in the study. Gated myocardial perfusion imaging (MPI) using Tc-99m MIBI and quantitative perfusion, function and phase analyses was carried out for each patient. Phase standard deviation (PSD), phase histogram bandwidth (PHB), left ventricular ejection fraction (LVEF), summed rest/stress perfusion scores (SRS/SSS) and summed difference perfusion score (SDS) were calculated according to quantitative perfusion SPECT (QPS) and quantitative gated SPECT (QGS) software.

Results: Both parameters of phase analyses, i.e. PSD and PHB showed significant correlations with SSS ($r=0.61$, $p<0.001$, $r=0.64$, $p<0.001$, respectively). There are also significant correlations of PSD and PHB with SRS ($r=0.56$, $p<0.001$ & $r=0.58$, $p<0.001$, respectively) but not with SDS ($p=0.635$, $p=0.563$). Among different factors such as QRS duration, LVEF <35% vs. 35-45%, SSS, SRS, territory of coronary stenosis and the risk factors of CAD such as diabetes mellitus, hypertension and obesity, the only independent factors affecting the severity of mechanical dyssynchrony were EF, SSS and SRS.

Conclusions: MPI with perfusion, function and phase analyses can be used to select the best candidates for CRT in CAD patients with heart failure. The patients with EF <35% and those with EF of about 35-45% concomitant with SRS >20, regardless of CAD territory, QRS duration, and CAD risk factors, are associated with more severe dyssynchrony and thus may be good candidates for CRT.