Heart Failure

**TIME-RESOLVED LEFT VENTRICULAR MYOCARDIAL STRESS IN HEART FAILURE WITH REDUCED EJECTION FRACTION REVEALS A MARKED INCREASE IN LATE SYSTOLIC MYOCARDIAL LOAD**

Poster Contributions
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**Background:** Systolic myocardial wall stress (MWS) quantifies myocardial afterload. Despite its time-varying nature, little data exist regarding time-resolved MWS in systolic heart failure (HF).

**Methods:** We studied 10 subjects with systolic HF (mean LV ejection fraction=40%). We assessed time-resolved LV volume and central pressure with magnetic resonance imaging and carotid tonometry, respectively. We computed time-resolved MWS using the Arts method and compared observed MWS patterns with previously reported data from subjects with preserved systolic function (n=42).

**Results:** In the presence of preserved systolic function, early systolic ejection determined a change in LV geometry that sharply reduced MWS relative to pressure during mid-systole (dashed arrow, top left panel), resulting in relatively low late systolic MWS (top mid-panel) even with prominent late systolic pressure augmentation (top right panel). The typical triphasic pressure-stress relation was also observed in subjects with systolic HF, but the normal mid-systolic shift in the pressure-stress relation was blunted (dashed arrow, bottom left panel), resulting in a failure to reduce late systolic wall stress (bottom mid panel) despite little or no pressure augmentation (bottom right panel).

**Conclusions:** Systolic HF is associated with marked abnormalities in the loading sequence due to an intrinsically abnormal pressure-stress relation. This abnormality may promote a vicious circle of adverse LV remodeling and failure.