Non Invasive Imaging (Echocardiography, Nuclear, PET, MR and CT)

NONINVASIVE ESTIMATION OF PULMONARY CAPILLARY WEDGE PRESSURE: A STUDY USING LEFT ATRIAL VOLUME, FUNCTION AND DEFORMATION PROPERTY ASSESSED BY SPECKLE TRACKING ECHOCARDIOGRAPHY

Poster Contributions
Poster Hall B1
Monday, March 16, 2015, 9:45 a.m.-10:30 a.m.

Session Title: Non Invasive Imaging: Advances in Clinical Non-Invasive Imaging
Abstract Category: 17. Non Invasive Imaging: Echo
Presentation Number: 1243-044

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Background: The ratio of early transmitral inflow velocity to mitral annular tissue Doppler velocity (E/e') is widely used to predict left ventricular (LV) filling pressure. However, the relation between left atrial (LA) deformation properties and pulmonary capillary wedge pressure (PCWP) has not been fully examined. The improvement of speckle tracking echocardiography (STE) can provide an accurate information of LA deformation property without angle dependency.

Methods: A total of 101 patients (age: 67±13, 60 men) without significant mitral valve disease and undergoing cardiac catheterization were enrolled. LA volume, LA total and active emptying function (EF), LA peak strain and LA strain rate during atrial contraction were measured from apical 4-chamber view by STE during sinus rhythm just before cardiac catheterization. Moreover, PCWP was estimated as ePCWP = 10.7 - 12.4 x KT index. The KT index was defined as Log (LA active EF / minimum LAV index) as we previously reported. E/e’ was also measured by Doppler and tissue Doppler echo.

Results: There was a weak but significant correlation between PCWP measured by catheterization and E/e’ (r=0.51, p<0.01) or LA peak strain (r=-0.49, p<0.01). There was a moderate correlation between PCWP and minimum LAV (r=-0.59, p<0.01), active EF (r=-0.68, p<0.01) and LA strain rate during atrial contraction (r=-0.62, p<0.01). There was a strong correlation between PCWP and ePCWP estimated by KT index (r=-0.79, p<0.01). Multivariate regression analysis revealed that ePCWP and E/e’ were independent predictors for PCWP. The ePCWP was the strongest predictor among echo-parameters to predict the elevated PCWP>15mmHg by ROC curve analysis (AUC=0.92). Using a cutoff value of 15mmHg of ePCWP, the sensitivity and specificity is 69 and 90%, and positive and negative predictive value is 76 and 86%.

Conclusion: Among echo-parameters including E/e’ and LA deformation parameters assessed by STE, the ePCWP by KT index obtained from the combined assessment of LA active EF and minimum LAV index was the most reliable predictor for PCWP. Noninvasive estimation of PCWP by KT index may have an incremental value in the therapeutic strategy in clinical setting.