

Assessment of left ventricular filling pressure: left atrial reservoir strain is an excellent replacement for missing tricuspid regurgitation velocity

F. Khan¹, K. Inoue², E.W. Remme¹, O.S. Andersen¹, E. Gude¹, H. Skulstad¹, M. Chetrit³, E. Garcia-Izquierdo Jaen⁴, J.W. Ha⁵, A.L. Klein³, S. Kikuchi⁶, N. Ohte⁶, S.F. Nagueh⁷, O.A. Smiseth¹

¹Oslo University Hospital Rikshospitalet, Oslo, Norway; ²Ehime University Graduate School of Medicine, Department of Cardiology, Pulmonology, Hypertension & Nephrology, Ehime, Japan; ³Cleveland Clinic, Cleveland, United States of America; ⁴University Hospital Puerta de Hierro Majadahonda, Madrid, Spain; ⁵Yonsei University College of Medicine, Seoul, Korea (Republic of); ⁶Nagoya University Graduate School of Medicine, Nagoya, Japan; ⁷The Methodist Hospital, Houston, United States of America

On behalf of Integrated cardiovascular function

Funding Acknowledgement: Type of funding source: Public Institution(s). Main funding source(s): South-Eastern Norway Regional Health Authority

Background: When evaluating left ventricular filling pressure (LVFP) according to current guidelines, tricuspid regurgitation (TR) velocity is often not available.

Purpose: In the present study we investigate if left atrial (LA) reservoir strain may be used instead of TR velocity for evaluation of LVFP.

Methods: We performed a prospective, multicenter, multinational and multivendor study in an all comer population of 322 patients with suspected heart failure or other cardiovascular disease where LVFP was measured by right- or left heart catheterization, as pulmonary capillary wedge pressure or pre-A LV diastolic pressure, respectively. Echocardiography was performed within 1 day of catheterization.

101 patients classified as special populations in the 2016 ASE/EACVI recommendations (i.e. non-cardiac pulmonary hypertension, atrial fibrillation, hypertrophic and restrictive cardiomyopathies) were excluded. Of the remaining 221 patients, 118 patients had EF $\geq 50\%$ and 103 patients had EF $< 50\%$. Regression analysis was performed for LA reservoir strain and

TR velocity against LVFP. LA reservoir strain at a cut-off value of $< 18\%$ was applied instead of TR velocity in the 2016 ASE/EACVI algorithm and compared with the current algorithm.

Results: LA reservoir strain correlated better with LVFP than TR velocity, $r=0.62$ vs 0.40 ($p<0.01$) (Figure 1). When replacing TR velocity with LA reservoir strain, the feasibility of the ASE/EACVI 2016 algorithm increased from 91.8% to 98.1%. The accuracy of the algorithm was not significantly altered (80% vs 79%).

An accuracy of 80% for the algorithm is lower than what has been reported in earlier publications, this may be due to inclusion of patients without suspected heart failure and no assessment of clinical data, which in turn may have influenced the accuracy of the algorithm.

Conclusion: LA reservoir strain has better correlation to LVFP than TR velocity, and can be used in the ASE/EACVI 2016 algorithm for estimation of LVFP as a replacement when TR velocity is missing.

Figure 1 Correlation plot for LA reservoir strain vs. LVFP and TR velocity vs. LVFP. The coloured area indicates patients that are correctly classified as normal or elevated filling pressure at a cut-off value of 18% for LA strain and 2.8 m/s for TR velocity.

