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Correlation Between Transmitral Early and Late Diastolic Velocities Ratio and Ratio of Medial Mitral Annular Early and Late Tissue Doppler Velocities

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Introduction

Echocardiography is now the most commonly used noninvasive tool for the assessment of cardiac anatomy and function. In addition to commonly established roles such as confirming the diagnosis, etiologic work-up, complication screening, and disease monitoring, echocardiography plays an important clinical role in prognostic assessment. Conventional echocardiographic predictors of poor outcome, such as left ventricular (LV) ejection fraction (EF) and restrictive filling pattern have recently been supplemented by tissue Doppler imaging (TDI). Tissue Doppler imaging is a robust and reproducible echocardiographic tool which has permitted a quantitative assessment of both global and regional function and timing of myocardial events [1,2,3]. Tissue Doppler echocardiography (TDE) is used in the assessment of diastolic function, however, it is unclear whether the medial (E# med) or lateral (E# lat) annulus should be used. There have been limited studies on the use of TDE in subjects with normal systolic function [4]. Systolic Tissue Doppler Imaging (TDI) parameters are complementary tools in the evaluation of left ventricular (LV) systolic function, especially in patients with subtle systolic dysfunction despite preserved LV ejection fraction Doppler tissue imaging (DTI) echocardiography is already a part of the standardized diastolic evaluation [5]. Its ability to detect early signs of cardiac disease before it is detectable by conventional echocardiography and its strong predictive power are encouraging [6]. Tissue Doppler imaging (TDI) echocardiography is an advanced echocardiographic modality, which is already part of the standardized diastolic evaluation [5,7]. The late diastolic velocity, a′, reflects the ventricles passive motion, which is dependent on the viscoelastic properties [8]. Echocardiographic assessment of left ventricular (LV) diastolic function is an integral part of the routine evaluation of patients presenting with symptoms of dyspnea or heart failure. Differentiation between normal and abnormal diastolic function is complicated by overlap between Doppler indices values in healthy individuals and those with diastolic dysfunction.The four recommended variables and their abnormal cutoff values are annular e'velocity (septal e'< 7 cm/sec, lateral e' < 10 cm/sec), average E/e' ratio > 14, LA maximum volume index > 34 mL/m2 , and peak TR velocity > 2.8 m/sec. n. LV diastolic dysfunction is present if more than half of the available parameters meet these cutoff values. The study is inconclusive if half of the parameters do not meet the cutoff values [9]. Diastolic dysfunction (DDF) is a significant predictor of maior adverse cardiac events (MACE) in the general population.A number of echocardiographic parameters have been shown to reflect DDF.How to interpret these parameters has been widely discussed and numerous classification al gorithms have been proposed. However, these algorithms often leave a substantial amount of patiemts as indeterminate due to incongruent echocardiographic parameter [10].

Background

Diastolic dysfunction is an early sign of the heart disease.Detecting diastolic disturbances is predicted to be the way for early recognizing underlying heart disease.Tissue Doppler imaging(TDI) parameters has shown to be a sensitive marker to detect progressive deterioration of cardiac function in various cardiac conditions. The aim of this research was to calculate e'/a' of medial annulus in patients with mild diastolic dysfunction and determine their diagnostic value

Methods

We prospectively studied (Igroup-control group) 50 adult outpatients with normal diastolic function and (II group)50 adult outpatients with grade I left ventricular (LV) diastolic dysfunction (2016 ASE/EACVI guidelines) and normal LV ejection fraction . We determined diastolic function as a I grade,using four criteria (1.Average E/e'>14,2-Septal e'velocity<7sm/sec or lateral e'velocity,10sm/sec.3-TR velocity .2.8m/s,4-LA volume or index>34ml/m2) or E/A≤0.8+E ≤50sm/sec Underwent 2D echo,including septal-lateral tissue Doppler e'/a' ratio. Standard TTE examinations performed on a commercially available system Epiq7. To assess LV diastolic function the transmitral early (E) and late (A) wave velocities were measured by pulsed Doppler ultrasound at the mitral leaflet tips. Peak systolic (s'), and early(e') and late(a') diastolic velocities of the medial mitral annulus were measured by pulsed tissue Doppler imaging from the apical four-chamber view. The ratio e'/a' was calculated. Data were expressed as mean±standard deviation. A $p<0.05$ was considered statistically significant.

Results

I group;The values of septal e'/a' ratio among the studies varied from 0.9 to 2.4 (mean 1.33±o.31).$p<0.00001$(image#1)
The values of lateral e'/a' ratio among the studies varied from 1to 2.0 (mean 1.75±0.53). $p<0.00001$

The values of E/A ratio varied from 1 to 2.1 (mean E/A- 1.38 ±0.26). p<0.00001

Age of patients varied from 17 to 51, (mean age-31), n=50%,25 were male,n=50%,25 were female.(image#2)

II group: The values of septal e'/a' ratio among the studies varied from 0.4 to 0.9 (mean 0.61±0.12), p<0.00001(image#3)

Mean LVEF was 56±3% (range 50%- 61%). p-0.008

The values of E/A ratio varied 0.4 to 0.9 (mean 0.61±0.12) (image#4)

Age of patients varied from25to91, (meanage-59.6±14).

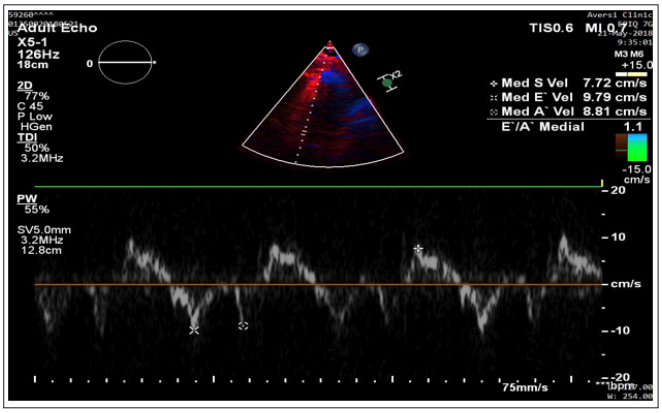

Image 1: Septal E'/A Ratio in Patients with Normal Diastolic Function

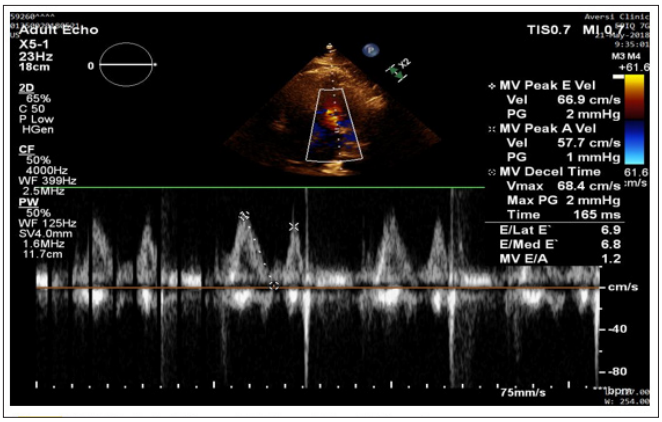

Image 2: E/A Ratio in Patients with Normal Diastolic Function

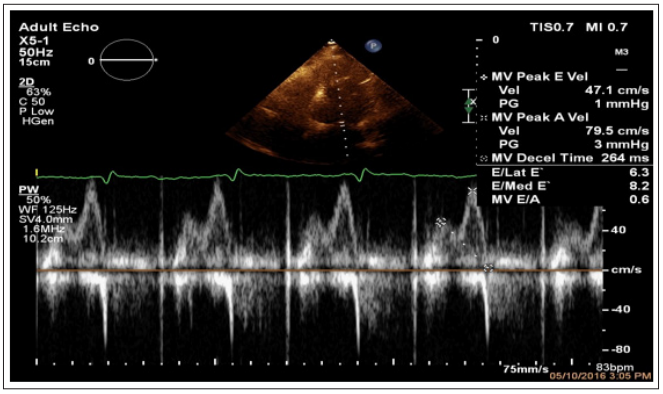

Image 3: E/A Ratio in Patients with Mild Diastolic Dysfunction

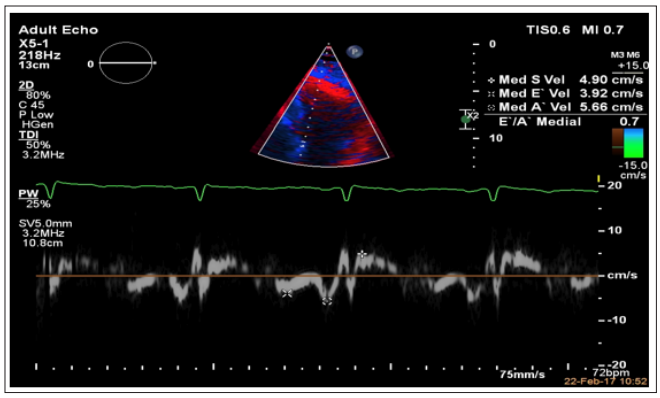

Image 4: Septal E'/A Ratio in Patients with Mild Diastolic Dysfunction

Conclusion

1. In patients with mild diastolic function early (e') and late diastolic (a') pulsed-DTI medial velocity ratio decreased compared with subjects with normal diastolic function.
2. E'/a'med. The ratio has a good correlation to E/A ratio in patients with mild diastolic dysfunction.
3. Future studies need to determine e'/a'med. ratio as a useful parameter to evaluate diastolic function

References

1. CheukMan Yu, John E Sanderson, Thomas H Marwick, Jae K Oh (2007) Tissue Doppler Imaging A New Prognosticator for Cardiovascular Diseases 49: 1903-1914.
2. Gorcsan J, Gulati VK, Mandarino WA, Katz WE (1996) Color-coded measures of myocardial velocity throughout the cardiac cycle by tissue Doppler imaging to quantify regional left ventricular function. Am Heart J 131: 1203-1213.
3. Yu CM, Lin H, Ho PC, Yang H (2003) Assessment of left and right ventricular systolic and diastolic synchronicity in normal subjects by tissue Doppler echocardiography and the effects of age and heart rate. Echocardiography 20: 19-27.
4. Piyush M Srivastava, Louise M Burrella, Paul Calafiore (2005) Lateral vs medial mitral annular tissue Doppler in the echocardiographic assessment of diastolic function and filling pressures: which should we use? Eur J Echocardiography 6: 97-106.
5. S Kou, L Caballero, R Dulgheru, C Henri, I Bensahi, et al. (2014) University Hospital of Liege (CHU), Cardiology Department Liege Belgium, Differences in Tissue Doppler Imaging parameters of left ventricular systolic function according to gender and age in healthy subjects. European Heart Journal 35: 288.
6. Tor BieringSørensen, Jan Skov Jensen, Sune Pedersen, Søren Galatius, Soren Hoffmann, et al. (2014) Doppler Tissue Imaging Is an Independent Predictor of Outcome in Patients with ST-Segment Elevation Myocardial Infarction Treated with Primary Percutaneous Coronary Intervention Copenhagen, Denmar J Am Soc Echocardiogr 27: 258-267.
7. Helle Gervig Carstensen, Linnea Hornbech Larsen, Christian Hassager, Klaus Fuglsang Kofoed, Morten Dalsgaard, et al. (2015) Tissue Velocities and Myocardial Deformation in Asymptomatic and Symptomatic Aortic Stenosis Copenhagen, Denmark 28: 968-980.
8. Tor BieringSørensen, Flemming Javier Olsen, Katrine Storm, Thomas FritzHansen, Niels Thue Olsen, et al. (2016) Prognostic value of tissue Doppler imaging for predicting ventricular arrhythmias and cardiovascular mortality in ischaemic cardiomyopathy cardiomyopathy Department of Cardiology,

Herlev and Gentofte Hospital, University of Copenhagen, Niels Andersensvej 65, Post 835, DK-2900 Copenhagen, Denmark; 2 Department of Medicine, Cardiovascular Medicine Division, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA; and 3 Faculty of Medicine, Aalborg University, Aalborg, Denmark European Heart Journal – Cardiovascular Imaging 17: 722-731.

9. Sherif F Nagueh, Otto A Smiseth, Christopher P Appleton, Benjamin F Byrd, Hisham Dokainish, et al. (2016) Recommendations for the Evaluation of Left Ventricular Diastolic Function by Echocardiography: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging Houston, Texas; Oslo, Norway; Phoenix, Arizona; Nashville, Tennessee; Hamilton, Ontario, Canada; Uppsala, Sweden; Ghent and Liege, Belgium; Cleveland, Ohio; Novara, Italy; Rochester, Minnesota; Bucharest, Romania; and St. Louis, Missouri (J Am Soc Echocardiogr 29: 277-314.
10. Niklas Dyrby Johansen, Tor BieringSørensen, Jan Skov Jensen, Rasmus Mogelvang (2016) Diastolic Dysfunction Revisited: A New, Feasible, and Unambiguous Classification Predicts Major Cardiovascular Events Faculty of Health and Medical Sciences, University of Copenhagen, Denmark; 2Department of Cardiology, Gentofte Hospital, Denmark; 3Department of Cardiology, Rigshospitalet, Denmark.. EHJ-Cv 188: 136-146.