Emergency Physician Bedside Echocardiographic Identification of Left Ventricular Diastolic Dysfunction

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BACKGROUND

- Heart failure affects 5.7 million Americans and its cost to our healthcare system was 31 billion in 2012.
- One half of patients with heart failure have heart failure with preserved ejection fraction (HfpEF), where there is abnormal diastolic function and grossly normal systolic function.

BACKGROUND

- These HFpEF patients have similar morbidity and mortality to those with systolic heart failure.
- Emergency physicians have been shown to accurately assess systolic function, there is little data for diastolic function.

OBJECTIVES

Can Emergency Physicians use Point of Care Ultrasound (POCUS) to accurately detect the presence and severity of diastolic dysfunction?

METHODS

- Single Center; Annual ED census 120,000
- Inclusion Criteria: Chief Complaint of CP/SOB/Syncope
- Exclusion Criteria: Atrial fibrillation, MVR, severe mitral calcification
- ED POCUS performed within 8 hours of Cardiology ECHO by US fellowship trained emergency physicians that received a 2 hour training lecture and deemed competent after supervised scans

METHODS

- **Data collected:**

  Mitral inflow E and A velocities, tissue doppler e' and a' velocities.

- **Data points considered abnormal:**

  e'< 8, E/e' >15, and LA diameter >4.5

Abnormal Values

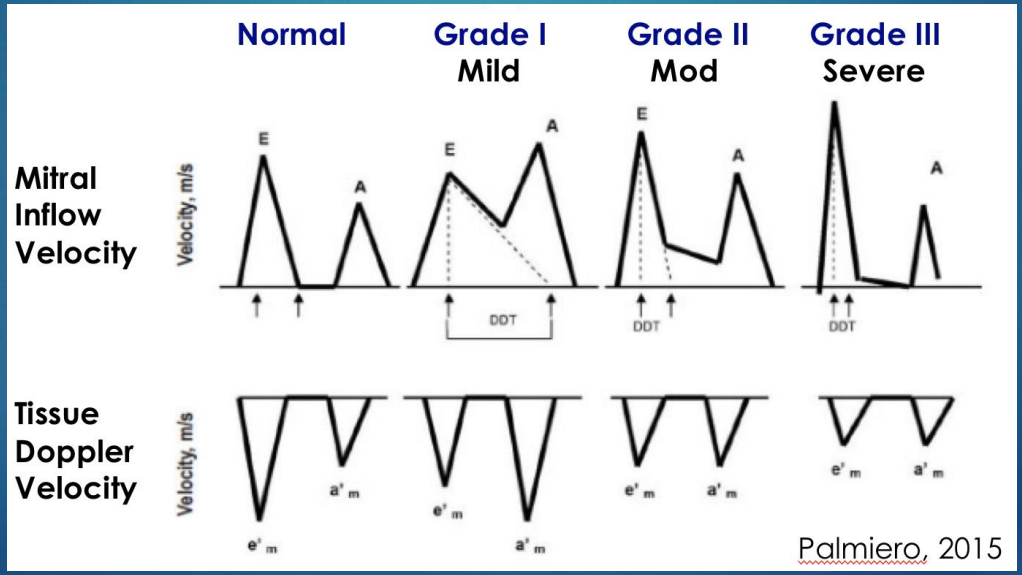
1) e' < 8 cm/s

2) E/e' > 15

3) Left Atrial Diameter > 4.5cm

METHODS

- Using this data and the morphology of the tracings, emergency physicians graded the patient as normal, grade I mild, grade II moderate, or grade III severe diastolic dysfunction.



http://asecho.org/wordpress/wp-content/uploads/2016/03/2016_LVDiastolicFunction.pdf

OUTCOMES

Primary Outcome:

- Presence of Diastolic Dysfunction

Secondary Outcome:

- Severity of Diastolic Dysfunction

Statistics:

- Kappa Coefficient

RESULTS

- To date: 105 patients enrolled
- 66% male, median age 66 years (range 27-94)
- Median length of EP POCUS = 8 minutes (range 2 to 24 minutes)

Primary Outcome: Identifying Diastolic Dysfunction

- Sonographer-based interpretation: Kappa = 0.37
- Algorithm-based interpretation: Kappa = 0.42

RESULTS

Secondary Outcome: Determining Grade

- Sonographer-based interpretation: Kappa = 0.29
- Algorithm-based interpretation: Kappa = 0.44

20 EP Images reviewed by Cardiologist:

- Identifying diastolic dysfunction: Kappa = 0.79

LIMITATIONS

- Time between EP POCUS and Cardiology ECHO
- Cardiologists obtain additional data points
- Variability in Grading Between Individual Cardiologists: Kappa = 0.30 to 0.96

CONCLUSIONS

EP POCUS vs. Cardiology: Moderate agreement

- Greater agreement in determining if diastolic dysfunction is present
- Less agreement in grading severity

CONCLUSIONS

EP POCUS vs. Cardiology using EP POCUS images:

- **High agreement** in determining if diastolic dysfunction is present

CONCLUSIONS

Algorithm vs Morphology

- **Algorithm-based interpretation is more accurate than Morphology-based interpretation**
- **Important when constructing any future curriculums aimed at teaching emergency physicians in diagnosing diastolic dysfunction.**

Questions?