Diastolic Function
Cases 2017

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DISCLOSURE

Relevant Financial Relationship(s)
None

Off Label Usage
None
Case

- 40 year old female referred for transplant evaluation
- 2012: fatigue and dyspnea
- 2013: Syncope on Midodrine Rx
- Bilateral hand paresthesia
- Recurrent admissions for CHF
- Now NYHA class III

Septum 14 mm
Posterior wall 14mm
Peak E wave: 0.7 m/s
E/A: 3.5
DT: 155 ms
e’ velocity: 0.03
E/e’: 23
What is the most likely diagnosis?

1. Hypertrophic cardiomyopathy
2. Amyloid cardiomyopathy
3. Hypertensive heart disease
4. Fabry’s disease

E/A: 3.5 E/e’ 23

1. Grade II
2. Grade III
3. Grade III (reversible)
4. Grade III
Case

• 57 year old male presents to the ER with progressive angina
• PMH: ACB 1998 and 2012; CHF, hypertension and familial hyperlipidemia

EF 60%  LAVI 47 cc/m²
E/A: 3.7
DT 111 ms
E/e': 50

E/A: 3.7; no change with Valsalva
DT 111 msec; E/e': 50

1. Grade II
2. Grade III reversible
3. Grade III irreversible

E/A > 2
Case

• 88 year old woman
• Echo for F/U PHT
• Asymptomatic

EF 65%  LAVI 43 cc/m²
What is this flow and what does it mean?

1. L wave: don’t know
2. B notch: high LVEDP
3. L wave: high LAP
4. Artifact

Triphasic mitral inflow with mid-diastolic flow is related to elevated filling pressures, delayed relaxation and slow heart rate indicating advanced diastolic dysfunction.

JASE 2004; 17:428
Case

- 89 year old woman presents to ER with progressive dyspnea
- PMH: hypertension
- Exam: BP 168/96 mmHg; mildly increased JVP; bibasilar crackles
- CXR: mild vascular redistribution, bilateral pleural effusions

EF 66%; Mild LVH; LAVI 62 cc/m²
E vel: 1.4 m/s; E/A: 2; DT: 133 ms

Grade III DD: E/A > 2

DO WE NEED ANY MORE INFO?

E/e’: 30
Case

- 49 year old woman: palpitations and near syncope
- Mild chest pressure on exertion
- Mother had cardiac issues
- No family history SCD

EF 70%  LAVI 47 cc/m²
Diagnosis

1. Apical HCM
2. Hypertensive HD
3. Apical HCM with apical pouch
4. Need more information
E velocity: 0.3 m/s
E/A: 0.75
DT: 240 ms
E/e’: 10
TR: 2.6 m/s
LA: 47 cc/m² E wave: 0.3m/s; E/A: 1.33; E/e’ 10; TR: 2.6/m/s

1. Grade I
2. Grade II
3. Grade III
4. Need more information

↑LVEDP

A duration: 122 ms
A_{(PV)} duration: 195 ms
A_{(PV)} – A_{(MV)} = 63 ms
Case

• 78 year old woman: dyspnea on exertion
• S/P MVR St. Jude #29 10 years prior
1. Normal prosthesis
2. Irregular profile due to atrial fib
3. Increased LVEDP
4. High filling pressures
Case

- 52 year old male: abnormal stress test
- Asymptomatic
- Avid exerciser
- Remote smoker

EF 65%  LAVI 45 cc/m$^2$
E wave: 0.9 m/s
E/A: 2.25
TRV: 2.4 m/sec

e’: .13 m/s
E/e’: 9

1. Grade I
2. Grade II
3. Grade III
4. Normal filling pressures
Assessment of Diastolic Dysfunction in Patients with Normal LVEF

1. Average E/e’ >14
2. Septal e’ velocity <7 cm/s OR lateral e’ velocity <10 cm/s
3. TR velocity >2.8 m/s
4. LA volume index >34 ml/m²

- <50% positive
  - Normal diastolic function
- 50% positive
  - Indeterminate
- >50% positive
  - Diastolic dysfunction

JASE 2016;29(4):277

LA Volume Index (cc/m²)

Why is the LA dilated?

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-34</td>
<td>35-41</td>
<td>42-48</td>
<td>&gt; 48</td>
</tr>
</tbody>
</table>
1. Bradycardia
2. High output states
3. OHT
4. A fib/flutter
5. Athlete’s heart

JASE 2015; 28:1-39
JASE 2016;29(4):277
Estimation of Left Ventricular Filling Pressure With Mitral Annular Calcification

Mean gradient < 3.5 mmHg

Mitral E/A

- <0.8: Normal LVFP
- 0.8-1.8: IVRT
- >1.8: High LVFP

IVRT

- ≥ 80 ms: Normal LVFP
- < 80 ms: High LVFP

Sensitivity 100%
Specificity: 90%

Abudiab, Zoghbi et al; JACC online 2017

80 year old woman SOBOE

EF 70%   LA 43cc/m²
Mean MV: 3 mmHg
E/A: 0.8
IVRT: 70 msec

Diastolic Function?
1. Grade II
2. Cannot tell (MAC)
3. Normal filling pressures
4. Increased filling pressures

E/A: 0.8; IVRT 70 msec
**Estimation of Left Ventricular Filling Pressure With Mitral Annular Calcification**

Mean gradient < 3.5 mmHg

Mitral E/A

- Mean MV: 3 mmHg; E/A: 0.8
- IVRT: 70 ms

- <0.8
  - Normal LVFP
- 0.8-1.8
  - IVRT
  - ≥ 80 ms: Normal LVFP
  - < 80 ms: High LVFP
- >1.8
  - High LVFP

**Case**

- 71 year old male: abdominal pain and leukocytosis: acute cholecystitis
- Rapid a fib. Possible old IMI
- Troponin T: 0.017 ng/ml
- Remote history stent unknown vessel
LA: 53 cc/m²  EF 39%

Peak E: 1.2 m/s
DT: 144 ms
IVRT: 60 ms

E/e': 20

TR: 3 m/s
DT: 144 ms  E/e’: 20  IVRT: 60msec

1. Normal
2. Increased
3. Don’t know

So what about atrial fibrillation?
Diastolic function in atrial fibrillation (depressed EF)

Increased filling pressures

- DT ≤ 160 ms
- IVRT ≤ 65 ms
- Septal E/e’ ≥ 11
Case

- 86 year old male: ER with dyspnea, fatigue and edema
- Persistent atrial fibrillation
- Recurrent thoracenteses
- Exam consistent with severe right heart failure

Septum 18 mm   Posterior wall 17 mm
LA 43 cc/m²  EF 61%