Is Echocardiography Necessary to Manage Submassive PE?

David M. Dudzinski MD, FAHA, FACC, FASE
Tuesday, November 19, 2019
@criticalecho

No disclosures

Appropriate Use Criteria from AHA/ACC/ASE

- Suspected [acute] PE in order to establish diagnosis
  “Rarely appropriate”
- Known acute PE to guide therapy (eg, thrombectomy and thrombolytics)
  “Appropriate”

JASE 2011;24:229.

Integrative assessment of severity
Continuum – not binary

Risk Stratification

<table>
<thead>
<tr>
<th>Estimated prevalence (%)</th>
<th>Estimated mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHCA</td>
<td></td>
</tr>
<tr>
<td>Massive (High)</td>
<td></td>
</tr>
<tr>
<td>Submassive (Int-high)</td>
<td></td>
</tr>
<tr>
<td>Lower Risk</td>
<td></td>
</tr>
</tbody>
</table>

Imaging in PE Prognosis: “RVS”

- **Size Measures**
  - RV (RV/LV)
  - RA
  - IVC
  - PA

- **Functional Measures**
  - RV systolic function
  - Right heart pressures
  - McConnell sign
  - Septal geometry
  - Pulmonary artery Doppler

Imaging in PE Prognosis

  #2017 Massachusetts General Hospital. CHEST 2017;152(4):944S.
  #2017 Massachusetts General Hospital. CHEST 2017;152(4):944S.

- **Integrative assessment of severity**
  - Biomarkers
  - Echo
  - CT
  - EKG

- **Continuum – not binary**

CT EKG Biomarkers

Biomarkers

Echo

CT

EKG

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  - IVC
  - PA

- **Functional Measures**
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  - Right heart pressures
  - McConnell sign; Doppler
  - Septal geometry

JASE 2010;23:685.

CT v. TTE for Submassive PE

- n=298, age 59 ± 17, 49% ♀, 90% White
- 104 had CT and TTE; 14 had composite outcome

<table>
<thead>
<tr>
<th>(-) RVS on CT</th>
<th>5 Day Event</th>
<th>(+) RVS on CT</th>
<th>5 Day Event</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-) RVS on TTE</td>
<td>25 (24%)</td>
<td>4%</td>
<td>37 (36%)</td>
<td>3%</td>
</tr>
<tr>
<td>(+) RVS on TTE</td>
<td>5 (5%)</td>
<td>20%</td>
<td>37 (36%)</td>
<td>30%</td>
</tr>
<tr>
<td>Subtotal</td>
<td>30 (29%)</td>
<td>7%</td>
<td>74 (71%)</td>
<td>16%</td>
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</table>


CT v. TTE for Submassive PE

Among patients with PE and RV strain by CT, positive versus negative TTE predicted 10x greater risk of clinical deterioration.

Tricuspid Annular Plane Systolic Excursion

- Measure of longitudinal shortening; assumes
  - Local excursion = global function
  - Base reflective of free wall and apex (specifically may not be true in disease)
- i in acute PE, PAH, and CTEPH
- Operator/image dependent but has prognostic info

Am J Respir Crit Care Med 2006;174:1034.

Prognostic Value of Echocardiography in Normotensive Patients With Acute Pulmonary Embolism

Piotr Przybylo, MD, PhD; Sylwia Golonka, MD; Barbara Lachowiczewska, MD, PhD; Maria Korotkiewicz, MD, PhD; Michal Czarniak, MD, PhD; Katarzyna Rutkowska, MD, PhD; Olgierd Dzikowski, MD, PhD; Piotr Pulsowski, MD, PhD; Anna Wysgld, MD

Amersfoort, Poland

JACC 2014;7:563
**TAPSE in Normotensive PE Patients**
- 411 PE pts
  - Age 64 ± 18
  - 58% submass, 41% low risk
  - 2% lytic
- Time to TTE
  - Admit: 193
  - <24h: 159
  - <72h: 59
- TAPSE ≤ 15
  - 20% PPV
  - 99% NPV

**RV-PA Coupling**
- TAPSE
  - RV-PA mismatch
- RVSP

**Summary: Echo in PE Management**
- **Prognostics:** TTE adds
  - ↑ Sn for RVS: NPV for events
  - ↑ Sp for RVS: PPV to target invasive interventions
  - → key in (shared) decision-making
- TTE also contributes to
  - Differential diagnosis (eg cancer, endocarditis)
  - Procedural planning / guidance (eg PFO, attachments)
  - Prognosis (eg RV failure)
  - Followup (eg JAHA 2018)