Right Ventricular Echocardiography

ACEP AEMUS
ADVANCED EMERGENCY MEDICINE ULTRASONOGRAPHY

Focused Practice Designation Exam Review Course

Acute RV Dysfunction

- Increased RV:LV size ratio
- Septal dyskinesia
- **Tricuspid regurgitation (TR):**
  - From all cardiac views in which emitted sound waves are aligned roughly with TR flow ($\theta = 0°$)
    - In these cases, cos 0° = 1, cos 20° = 0.94, cos 30° = 0.87. Cos θ is a factor in the equation for the Doppler shift. Stay within 20°.
  - ***Caveat:*** 25-405 will not have a jet using color Doppler
- Decreased tricuspid annular plane systolic excursion (TAPSE) < 17 mm
  - Associated with increased PE-related 30-day mortality
- Decreased S' <9.5 cm/sec
- **Elevated pulmonary artery systolic pressure (PASP) >35 mm Hg**
  - Correlates with right-heart catheterization
  - PASP = TRPG + RAP = ΔPRV-RA+ RAP = (4 x $TRVmax^2$) + RAP
  - 1) Obtain TR using color Doppler. Use continuous wave Doppler to generate waveform. Obtain $TRVmax^2$.
    - ***Dilated, non-collapsible IVC:*** 15 mm Hg
    - ***Thin and collapsible:*** 3 mm Hg
    - ***In-between:*** 8 mm Hg
- Decreased pulmonary artery acceleration time (PAAT) <105 msec suggests elevated pulmonary artery pressure
- Pulmonary artery mid-systolic notching

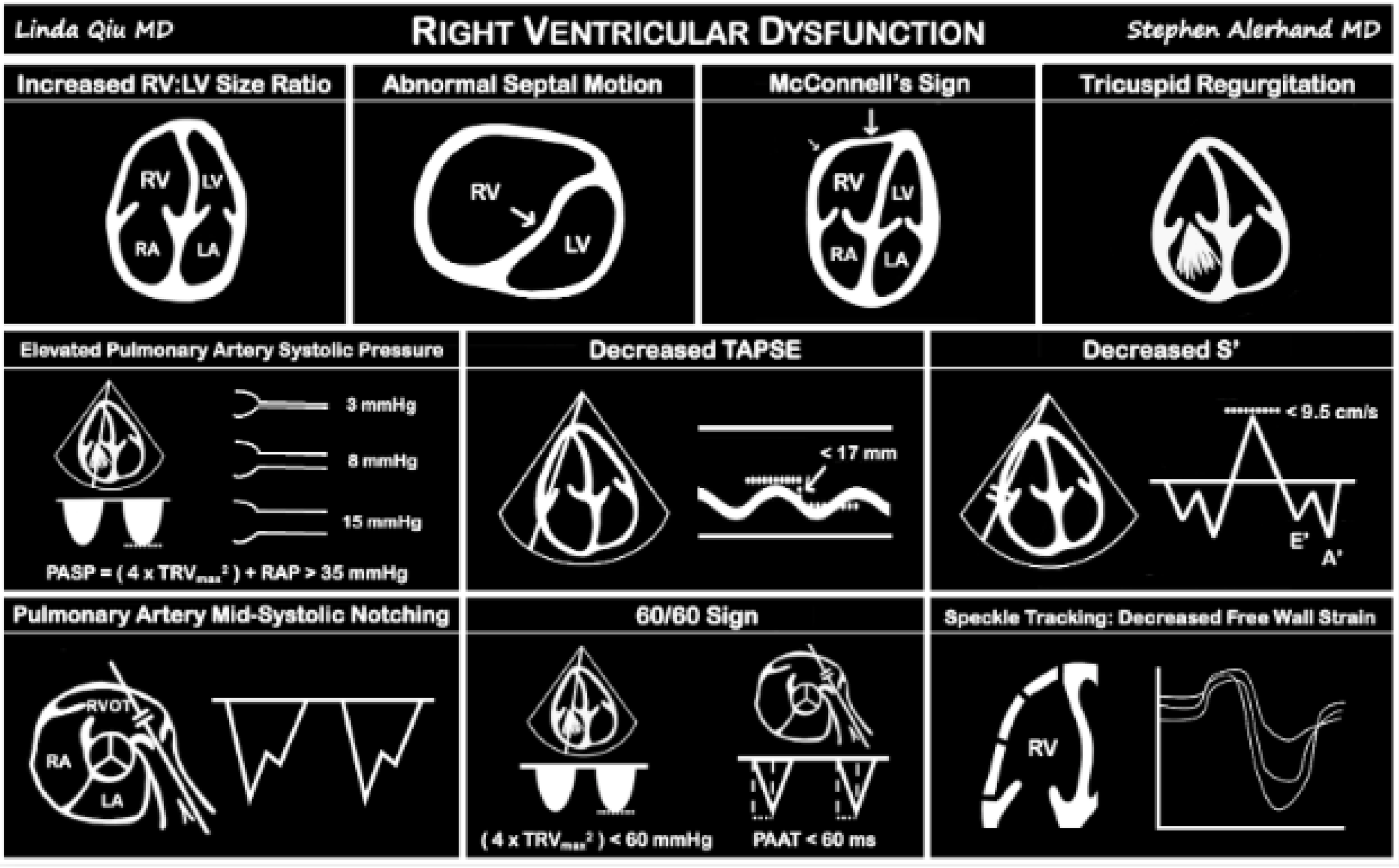
Acute vs Chronic RV Dysfunction

- Acute (eg, pulmonary embolism) versus chronic (eg, pulmonary hypertension) RV dysfunction
- Right heart thrombus: acute PE
- Right ventricular free wall thickness >5 mm in SXLA (or PLAX) suggests **RV hypertrophy;** this is an adaptive change that decreased wall stress by the **law of Laplace.**

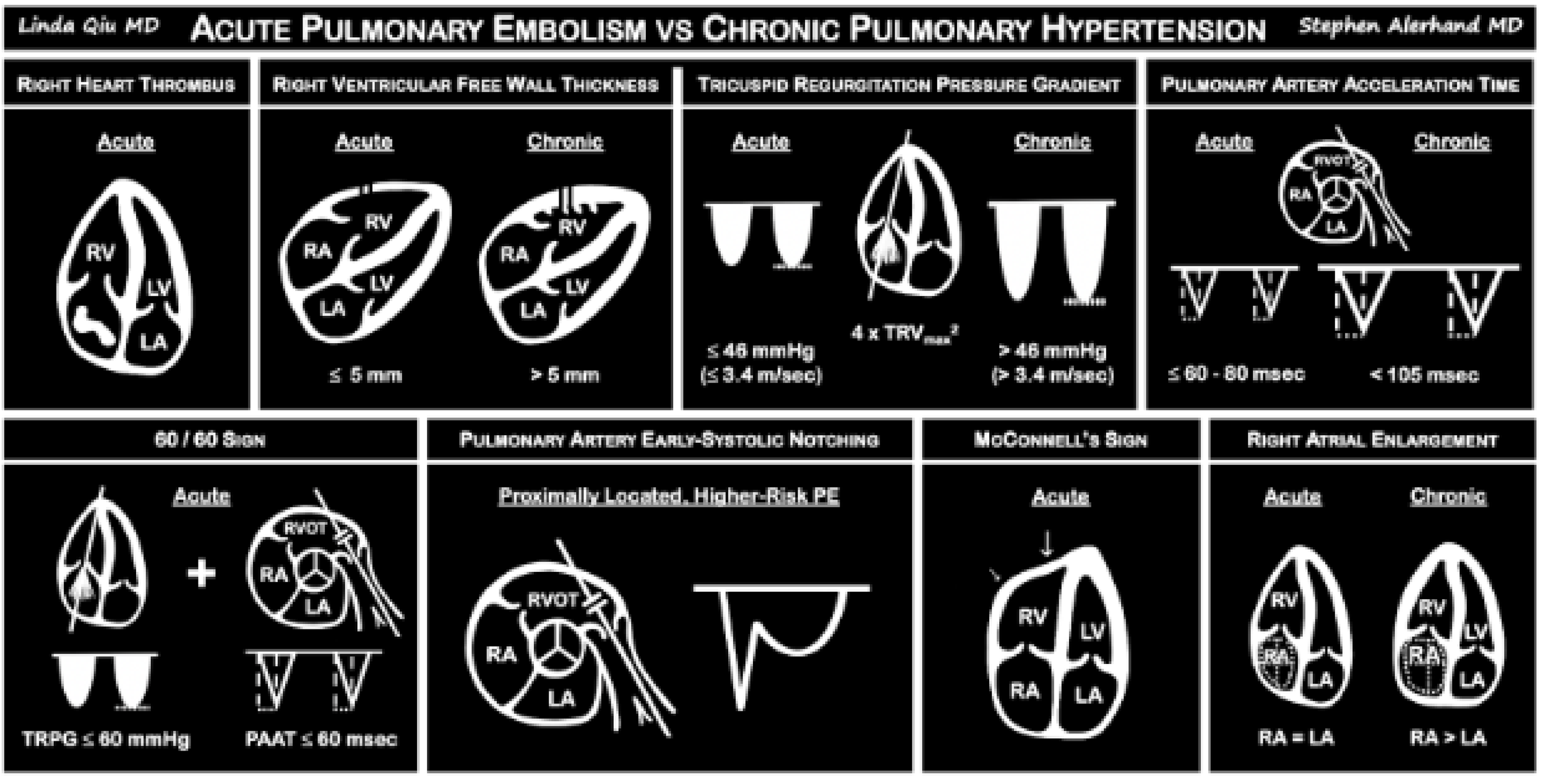
Acute vs Chronic RV Dysfunction (cont'd)

- TRPG ≤46 mm Hg suggests **acute**, TRPG >46 suggests **chronic**; it is the RVH that leads to the increased ΔPRV-RA and can such high PASP.
- PAAT ≤60-80 msec suggests **acute**, PAAT <105 msec suggests **chronic**; the increased PVR without the time for PA compliance leads to more rapid propagation of sound waves; PA waveform goes from rounded and dome-shaped (normal) to triangular (increased PA pressure).
- **60/60 sign: TRPG ≤60 mm Hg and PAAT ≤60 msec**
  - The original authors used TRPG, but since then people have manipulated this sign to use PASP. It's unclear which ones the test-writers would use.
- PA early-systolic notching suggests **acute PE;** the reflection site is more proximal with a **proximal PE,** so the sound waves are reflected back earlier; mid-systolic notching is thus more common with a peripherally located PE or PH, where the reflection site is more distal.
- **McConnell's sign suggests acute.**

Illustrations



Illustrations (cont'd)



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