Stress echo for assessment of dyspnea

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No disclosures

stress test for evaluation of exertional dyspnea

- CAD
- Non-ischemic cardiomyopathy
- Valve ds
- Pulm htn
- Pulmonary ds
- Deconditioning
- Diastolic dysfunction

Deconditioning

- Limited exercise capacity
- Rapid rise in heart rate
- Typically normal LV function
Diastolic stress test
Assessment of LV filling during exercise

• Normal diastolic filling with exercise
  – Rapid relaxation, normal filling
  • High E, lower A (fusion), shorter decel time
  • Increased e’
  • E/e’ remains low

• Subclinical Diastolic dysfunction with exercise
  – LA pressure increases
  • E increase out of proportion to e’ so E/e’ rises
  – E/e’ > 13

• Diastolic abnormalities persist longer than WMA so assess WMA first then Doppler

Post exercise E/e’ > 13
  – Highly specific (90%)
  • Elevated LVDP during exercise
  • Reduced exercise capacity
  – Sensitivity 63%

The diastolic dysfunction may be due to CAD so need to assess for WMA also
Valuable to differentiate cardiac from non-cardiac etiologies for dyspnea

Diastolic stress echo:
identifying elevations in LVDP during exercise and relating it to decreased exercise capacity

• Burgess et al, JACC 2006:47:1891-900
  – 39 patients undergoing bike echo + left hrt cath
  – E/E’ at rest and with exercise
  – 54% LVDP nl; 24% elevated LVDP only with exercise; 22% LVDP high at rest
  – Exercise E/E’ > 13
  • Best cut point for elevated LVDP
  • 90% specific for decreased exercise capacity

Kane and Oh, Curr Cardiol Rep 2012;14:359-365

Valuable to differentiate cardiac from non-cardiac etiologies for dyspnea
Potential to evaluate exertional dyspnea
Burgess et al, JACC 2006;47:1891-1900

What should I do with this patient?

- 70 yo father of a cardiologist
  - s/p lobectomy for Ca now NED
  - HTN, No angina but family hx
  - Coronary Ca++
    - 11 min ex, no sx but with impressive ST depression, normal SPECT
  - Trip planned to China with option for high altitude (10,000 feet) side trip

- Referral to MGH
  - Would pulm htn explain his ex ECG change?
  - What is his risk for high altitude pulmonary edema
Exercise echo

- 13 min 18 sec on bike (7.3 METS)
- 97% Max predicted HR
- No symptoms
- ST dep on ECG during exercise
  - resolved during exercise
- No WMA
- SBP 122 to 200 mm Hg
- RVSP 42 mm Hg to 78 mm Hg
  - RV function preserved with exercise
Asymptomatic exercise induced rise in pulmonary artery pressure

- Treatment or not?
- What is his risk for HAPE?
- Is he allowed to travel to high altitude?

Ascent to high altitude stimulates pulm arterial vasoconstriction resulting in rise in PAP

- Hypoxia is primary stimulus
  - Underlying mechanisms
    - Potassium channel inhibition, Ca++ release, ADP-ribose,
    - Hypoxic pulm art vasoconstriction plays important role in development of HAPE
• If optional best to avoid high altitude
  – Option he took

• If travel to high altitude critical
  – Since asymptomatic could try control of BP, staged acclimatization to high altitude by gentle ascent, prophylactic treatment with Diamox,
  – Educate patient as to symptoms of HAPE
    • Understand immediate treatment is descent
  – Have arrangements for rapid descent if needed
  – Bring meds with him for HAPE (oxygen, nifedipine, steroids, etc)

• Patient opted to avoid high altitude leg of trip

Role of stress echo in valve disease

• History
  – 51 year-old woman with rheumatic mitral stenosis
  – First valvuloplasty in 1999; PMV at MGH in 2004
  – Atrial flutter and re-entry AV nodal tachycardia – ablated
  – Progressive fatigue
• Selected Prior Echoes
  – 11/04 (pre-PMV) grad: peak 20, mean 11mmHg. MVA 1.1 cm² Trace MR,
  – 12/04 (post-PMV) grad: peak 16, mean 7 mmHg. MVA 1.5 cm² Mod MR.
  – 11/2005 grad: peak 18, mean 6. MVA 1.5 cm² Mod eccentric MR.
Exercise

- Supine bicycle for 6 minutes and 28 seconds
- Achieved 3.4 METS
- Baseline: HR 58, BP 139/69
- Peak exercise: HR 102 (60% age predicted max), BP 194/83
- Developed mild dyspnea but stopped due to leg fatigue

Fatigue is due to:

- A. poor functional capacity
- B. mitral valve disease
- C. rheumatic cardiomyopathy
- D. CAD
Exercise Echo in Mitral Stenosis

- In patients with symptoms out of proportion to the severity of mitral stenosis on resting echo, exercise echo can be helpful.
- The following are highly suggestive that MS is the culprit for the symptoms
  - RVSP > 60 mmHg with exercise
  - Mean gradient >15 mmHg with exercise

Wu et al. Echocardiography 2004;21(5):451-456

Reis et al. JACC 2004;43(3):393-401

DSE in Mitral Stenosis