Stress Echocardiogram

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Stress Echocardiography

Overview

- Background & physiology
- Indications
- Imaging techniques
- Image interpretation
- Protocols
Stress Echocardiography

Overview

• Contrast agents
• Doppler stress echocardiogram
• Evolving techniques
• Safety and contraindications
Background

- Dynamic evaluation of cardiac structure and function
- at rest and stress
- provoked by exercise or pharmacological agents
Indications

Overview

- Ischemia/hybernating myocardium
- Valvular function (doppler)
- Pulmonary artery pressure
- LV diastolic function
Indications

• 2007 American Society of Echocardiography (ASE) Stress Echocardiography Guidelines
Image Acquisition

Echocardiographic Windows

- Apical
- Parasternal
- Subcostal
Coronary Artery Disease (CAD)

- Ischemic burden
- Necrosis/hybernation
- Risk stratification
Physiology

Ischemic Cascade

- Pain
- ECG changes
- Elevated filling pressures
- Systolic dysfunction
- Diastolic dysfunction
- Biochemical changes

Duration of Ischemia
Physiology
Ischemic Cascade

Image Analysis

Wall Motion

- Normokinesia
- Hypokinesia
- Akinesia
- Dyskinesia
Echocardiographic Loops

Examples
Image Analysis

Correspondence with Coronary Anatomy
Image Analysis

16 or 17 Segment Model
Quantitative LV Assessment

- Calculation of left ventricular ejection fraction (LVEF)
- Formula: \[ \frac{(EDV - ESV)}{EDV} \times 100 = EF \% \]
- Assessment of LV volumina with the method of discs (modified Simpson's rule, biplane)
  - EF increase
  - Volumina decrease
  - Cavity size smaller
  - LV hypercontractile
Mitral Valve

- Asymptomatic severe stenosis
- Disproportionate symptoms vs mild stenosis on doppler
- Exercise tolerance in MR
Aortic Valve Stenosis

- Low output-low gradient stenosis
- Dobutamine stress echocardiogram
Hypertrophic Cardiomyopathy

HCM

- Change in LVOT gradient
- Symptoms
- Exercise tolerance
- Arrhythmias
Dobutamine Echocardiogram

• Graded infusion (5, 10-40 µg/kg/min)

• For viability 2.5 µg/kg/min (bi-phasic response)

• Drug interactions
Other Stress Methods

- Vasodilator (Dipyridamole, Adenosine)
- Atrial pacing
- Strain imaging
Contrast Echocardiogram

- Microbubble contrast agents
- Enhanced LV border definitions
- When 2 or more segments are poorly visualized
Summary

- Exercise and pharmacologic protocols
- Large range of indications
- Low risk procedure
- Moderate cost
- No radiation
Thank You