Pericardial Effusion & Tamponade

Semantics

- The difference between pericardial effusion and pericardial tamponade is “intra-cardiac pressure”.

- **Pericardial Effusion** – fluid in the pericardial space

- **Pericardial Tamponade** – fluid in the pericardial space that is compressing the inflow great vessels, the cardiac chambers, and/or the outflow great vessels.

Compressive / Accumulative Contents

1. Blood & clots (post-cardiotomy, chamber perforation, dissecting Ao aneurysm, trauma, anti-coag)
2. Exudative effusions (malignant states, infective pericarditis, idiopathic pericarditis)
3. Non-exudative effusions (uremia, SLE, RA, post-radiation)
4. Air

Gradations of Effusion

- **Minimal** (50-100 cc) – visceral and parietal layers separated by 0.5 cm in diastole
- **Small** (100-250 cc) – visceral and parietal layers separated by 0.5-1 cm in diastole
- **Moderate** (250-500 cc) – visceral and parietal layers separated by 1-2 cm in diastole
- **Large** (> 500 cc) – visceral and parietal layers separated by > 2 cm in diastole

Diagnosis

- Beck's Triad (1935)
  A. Hypotension
  B. Increased JVP
  C. Muffled heart sounds

- *Pulsus paradoxus* – inspiratory decrease of arterial pressure > 10 mmHg with venous pressure that remains steady or increases

- *Electrical alternans* – beat-to-beat shifts in the electrical axis

- *Kussmaul sign* – distended neck veins with inspiration

- EKG – nonspecific ST- and T-wave abnnormalities, low-voltage QRS complex, signs of myocardial ischemia and pericarditis

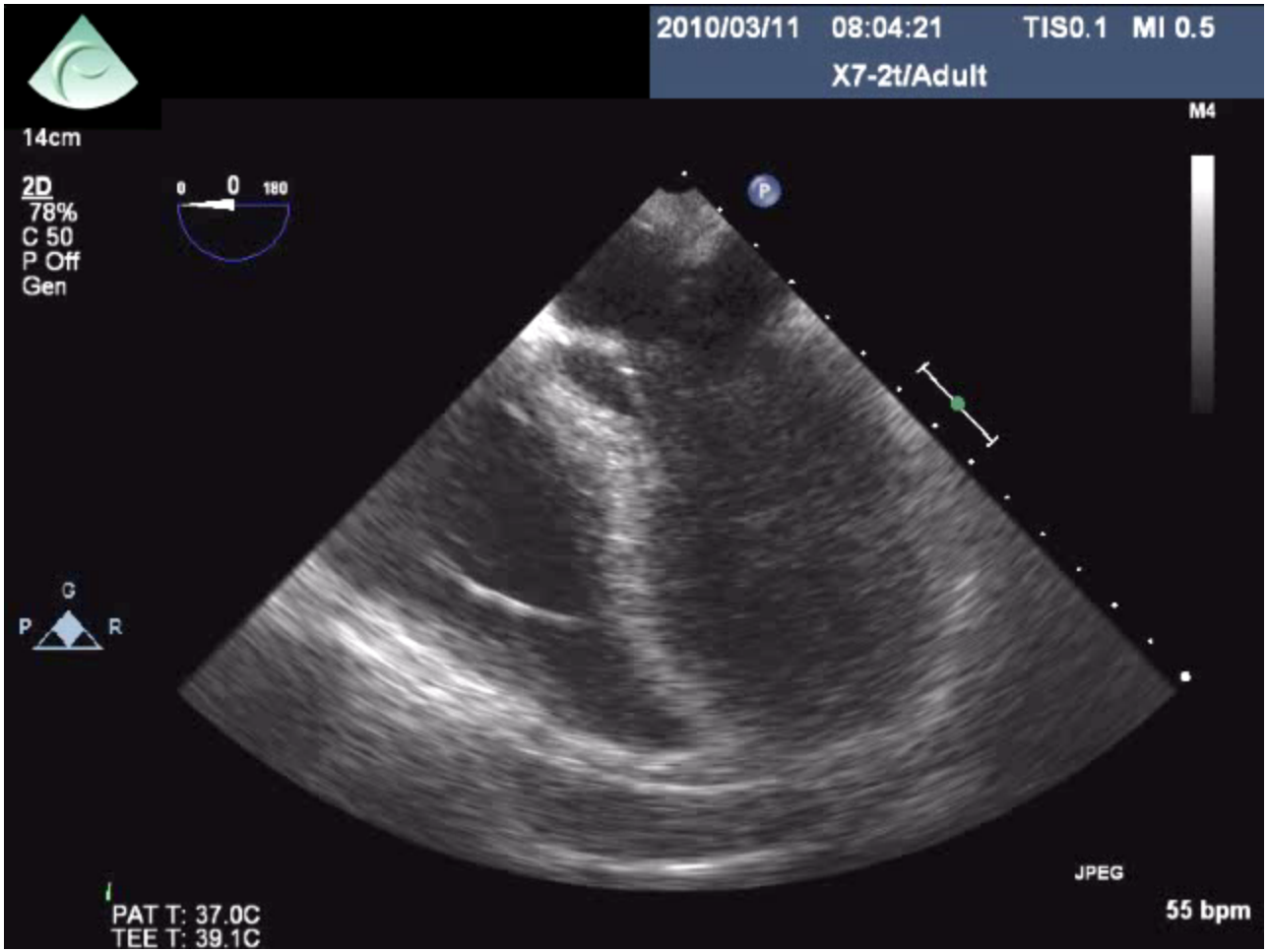
- Equalization of of diastolic blood pressures:
  CVP = PA diastolic = PAOP

Pericardial Tamponade

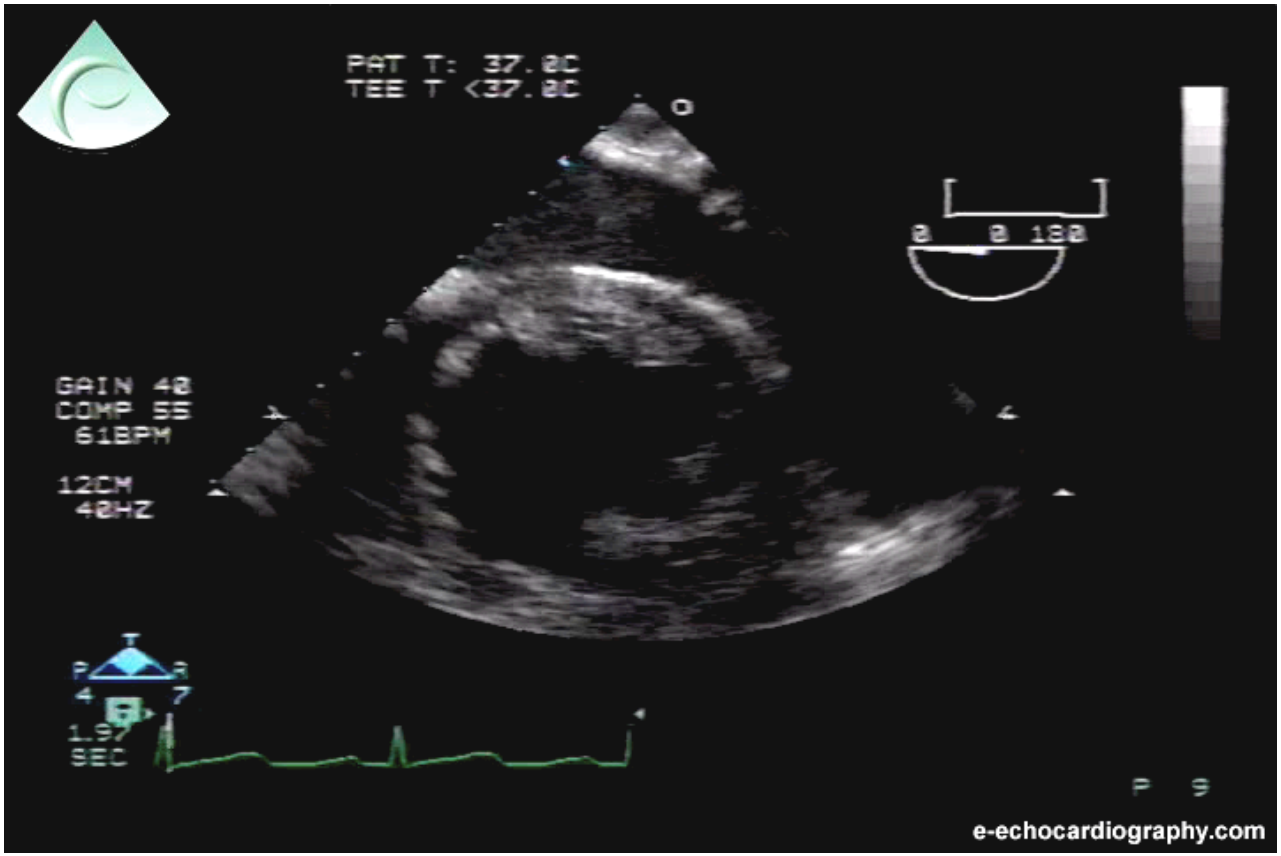
- RA Collapse – 95% sensitivity, 100% specificity, 90% positive

- RV Collapse – occurs when pericardial pressure exceeds RV pressure

Pericardial Effusion with LV Elongation



Pericardial Effusion (LV-SAX)



Go to “Echo Video Loops” to see what Tamponade looks like on echo

Treatment of Tamponade

- **Acute Management:**
  - Pericardiocentesis by surgeon / cardiologist.
  - Anesthesiology performed pericardiocentesis if necessary (4th intercostal space in mid-clavicular line)
- Beware of LAD or ventricle laceration.
  - Makes bad situation even worse!

Anesthetic Management of Tamponade

- **<u>Anesthetic Goal</u>: Full, Fast, & Forward!**
- If possible, local anesthetic only for subxyphoid pericardiotomy or pericardiocentesis.
- Maintain:
  1. High filling pressures
  2. High heart rate
  3. Avoid cardiac depressants
  4. Maintain spontaneous ventilation to prevent increased thoracic pressure as tolerated
  5. Gentle positive pressure ventilation if necessary
  6. Last resort is induction of GA

Anesthetic Management of Tamponade

- Potent vasopressers may be needed (Epi, Nor-Epi, Dobutamine, Vasopressin) to optimize preload.
- Induction with Ketamine as last resort.
- **Post pericardial relief of tamponade:**
  - Increased risk for pulmonary edema from maintaining high CVP for preload (diuretics or NTG may be appropriate).