Anesthesia for cardiac diseases
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NORMAL

Everything goes in the right direction without impediment

AORTIC STENOSIS

Fixed, chronic obstruction to LV ejection at the level of the aortic valve

LV ↑
LV dysfunction late
- Potential for myocardial ischemia
- Both supply & demand

LOW COMPLIANCE VENTRICLE

- Need adequate filling pressure to fill the ventricle
  - Sensitive to volume depletion
  - Atrial kick crucial
- Wide swings in ventricular filling pressure
  - Don’t overtreat
  - PAOP & LAP underestimate LVEDP

AS - MVO₂

- Demand up
  - Pressure generation
  - More muscle to feed
  - ↑ Wall tension
- Supply may be impaired
  - ↓ perfusion pressure
  - ↓ capillary density
  - ? ↓ diastolic relaxation
- 1/3 of AS pts with angina have clinically unimportant CAD

AS - SYMPTOMS

- Angina
- Syncope
  - Inability to maintain CO & BP in face of peripheral arteriolar dilation
  - Bradycardia - “fixed” SV dependent on HR
- Dyspnea
  - Diastolic dysfunction - ↑ LVEDP secondary to ↑ compliance; contractility is normal
  - Systolic dysfunction - ↑ LVEDP secondary to poor LV function

AS - ANESTHESIA

- Preop: interpret symptoms
  - Echo
- Intraop: anticipate
  - Keep full
  - Keep perfused
  - Love sinus rhythm
- Monitor
  - A-line - “beat-to-beat!”
  - ECG often not helpful; same with PA cath

AS - HEMODYNAMICS

<table>
<thead>
<tr>
<th>PRE</th>
<th>AFTER</th>
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<tbody>
<tr>
<td>CONTR</td>
<td>No prob</td>
</tr>
<tr>
<td>RATE</td>
<td>NTS-NTF</td>
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<tr>
<td>RHYTHM</td>
<td>NSR</td>
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<tr>
<td>MVO₂</td>
<td>Worry</td>
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CARDIAC TAMPOONADE

- Acute and/or chronic cardiac underloading
- LV, LA, RV, RA ↓

TAMPOONADE - HEMODYNAMICS

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HCM (IHSS)

- Dynamic obstruction to LV ejection below the level of the aortic valve
- LV ↑
ASH & ANESTHESIA

- 77 pts: retrospective review
- 31 adverse events
  → 1-MI/VT cardioversion
  → 12 CHF
- Risk factors
  → Surgical time, major surgery, monitoring
- Who cares?
  → Age, gender, gradient, SAM, MR, anesthetic

MITRAL STENOSIS

Fixed, chronic obstruction to LV filling

LA, RV ↑
LV ↓

MITRAL STENOSIS (PHT)

LA, RV, RA ↑↑

AORTIC INSUFFICIENCY

Chronic LV volume overload α orifice size, time, pressure gradient

LV ↑
HIGH COMPLIANCE VENTRICLE

AORTIC INSUFFICIENCY (ACUTE)
LV volume overload α orifice size, time, pressure gradient, ventricular size

AORTIC INSUFFICIENCY

AI - HEMODYNAMICS
PRE
AFTER
CONTR
RATE
RHYTHM
MVO₂
NAP (?)
sI
NAP
NS

MITRAL REGURGITATION
Chronic LV & LA volume overload α orifice size, time, pressure gradient
LV, LV ↑

MITRAL INSUFFICIENCY (GOOD LV)

MITRAL INSUFFICIENCY (NOT-SO-GOOD LV)
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**Mitra Insufficiency**

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Volume</th>
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**MR - Hemodynamics**

- PRE
- AFTER
- CONTR
- RATE
- RHYTHM
- MVO₂

**Cardiac Evaluation**

- Valve abnormality
- LV function
  - Systolic (no squeeze) AND diastolic (no relax)
  - Hx, PE
  - CXR - cardiomegaly
  - Echo
- RV function - systolic
- Rate and rhythm
- Pulmonary
- Preop assessment
  - Co-morbidity
  - Airway, vascular access, etc

**Ideal hemodynamics**

**Appropriate monitoring**

**Anesthetic technique**

\[ \text{**Cardiac evaluation**} \]

\[ \text{**Intraop mgt**} \]

- Routine monitors (DFTRM!!)
- Surgery considerations
- **Ideal hemodynamics**
- **Appropriate monitoring**
- **Anesthetic technique**

You don’t forget those routine monitor

**Carotid Evaluation**

- LV function
  - Systolic (no squeeze) AND diastolic (no relax)
  - Hx, PE
  - CXR - cardiomegaly
  - Echo
- RV function - systolic
- Rate and rhythm
- Pulmonary (N, PFT’s AnnFEC)
  - CXR, Hx

(No, PFT’s are not needed for every case!)

**AS**

Pressure-volume loop of aortic stenosis