Pre-operative Cardiac Evaluation
Disclosures

None
Why?
"Clear"
Goals of pre-operative cardiac evaluation:

- Help patient, family and surgeon weigh risks and benefits of surgery
- Uncover undiagnosed or sub optimally treated conditions
- Help optimize timing of surgery and type of procedure if options are available
- Help prevent/treat cardiac complications.
Cardiac Risk

- Initial preoperative evaluation and risk stratification is done by Primary Care
- Risk is related to patient and surgery specific characteristics.
ACC/AHA Guideline Summary:  
(Cardiac Risk for Non Cardiac Surgical Procedures)

High Risk: (reported risk of cardiac death or MI can be 5% or more)
  • Aortic and other major vascular surgery

Intermediate risk: (reported risk 1 to 5%)
  • Carotid endarterectomy
  • Head and neck surgery
  • Intraperitoneal and intrathoracic surgery
  • Orthopedic surgery
  • Prostate surgery

Low risk: (reported risk less than 1%)
  • Endoscopic procedures
  • Superficial procedures
  • Cataract surgery
  • Breast surgery

## Relative Risk by History

<table>
<thead>
<tr>
<th>Condition</th>
<th>Relative Risk Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD</td>
<td>2.4x</td>
</tr>
<tr>
<td>CHF</td>
<td>1.9x</td>
</tr>
<tr>
<td>DM</td>
<td>3.0x</td>
</tr>
<tr>
<td>Renal Insufficiency</td>
<td>3.0x</td>
</tr>
<tr>
<td>Poor functional capacity (&lt;4blocks/2flights)</td>
<td>1.8x</td>
</tr>
<tr>
<td>High Risk Surgery</td>
<td>2.8x</td>
</tr>
</tbody>
</table>
MAJOR PATIENT PREDICTORS
(up to 10-20% increase in risk)

- Severe Resting Angina/USA/Recent MI (4-6 weeks per ACC National Database)
- Decompensated HF
- Uncontrolled Arrhythmia (Tachy OR Brady)
- Severe Valvular Heart Disease (AS or MS)

**AS – 17.3% risk of CV complications, 13% risk of CV mortality**
RCRI (quick risk estimator)
REVISED CARDIAC RISK INDEX (RCRI)

Six independent predictors of major cardiac complications (1)

- High-risk type of surgery
- History of ischemic heart disease
- History of CHF
- History of CVA
- Diabetes mellitus
- Preoperative serum creatinine >2.0-mg/dl

Rate of cardiac death, MI, and cardiac arrest (2)

- No risk factors – < 1%
- One risk factor – 1.0%
- Two risk factors – 6.6%
- Three or more risk factors – over 10%

References:
Preoperative Cardiac Assessment
Starts with a good H & P
“I’d better run some tests... It could be cancer.”
History

- **Symptoms:** chest pain/angina, DOE, palpitations, syncope
- **PMH:** CAD, CHF, dysthymias, valve disease, PAD, HTN, DM, RI

**Functional Capacity (Mets):**

- 1 = Can take care of self, accomplish ADLs
- 4 = Can walk up a flight of stairs or a hill
- 4-10 = Can do heavy work around the house (scrub floors, lifting/moving heavy furniture, (able to walk 2 flights of stairs, or 4 blocks)
- >10 = Can participate in strenuous sports
Importance of Functional Capacity

Exercise time is a strong prognostic indicator:
- 10 METS of exertion correlates to very low risk
- Less than 4 METS increases risk 4-fold
- Inability to exercise is highest risk
Exam

- BP, HR, RR
- rales, wheezing, edema
- murmurs(AS/MS), gallops
- pulses, bruits, AAA, cyanosis, ulcers
EKG
(ECG not strongly assoc with risk or outcome)

- Q waves
- ST changes
- BBB
- Arrhythmias
- Prolonged QT
- WPW
Which patients should have a Pre-Op Cardiac Consultation?
“I don’t like these curiosity levels one bit.”
Cardiac Consultation Suggested

- ACS
- Decompensated CHF
- Significant Dysrhythmias
- Significant Valve disease
- A.fib with tachycardia or bradycardia
Consider Cardiac Consultation

- Dyspnea of unknown origin
- Patients with current or prior HF with worsening dyspnea or other changes in clinical status
- Suspected severe valvular heart disease (particularly AS and MS)
Potential recommendations after risk estimation and medical evaluation

- Proceed with surgery accepting cardiac risk

- Postpone surgery for medical stabilization

- Postpone surgery for CV testing or intervention

- Change surgery to lower risk procedure or non surgical alternative
Summary Recommendations
Part 1
All patients undergoing non-cardiac surgery should have an assessment of perioperative cardiac event risk by primary care physician.
Use information from history, physical exam, ECG, type of surgery, and prior testing to estimate perioperative cardiac risk. Utilize revised cardiac risk index (RCRI)
MAJOR PATIENT PREDICTORS
(up to 10-20% increase in risk)

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Cardiac Testing
“Still, let’s do an x-ray just to be sure.”
Stress Testing

- Some studies have shown pre-op stress testing can stratify patients as high risk of perioperative events
  - **NI nuclear** associated with a 1% operative risk
  - **Abnl nuclear** increases risk up to 10%
- However, **No study** has shown that intervention subsequent to stress testing improves outcomes
- Generally done **only** if is indicated in absence of surgery
Stress Testing

- Elective Surgery in Int/High risk pts with poor functional cap (< 4Mets)
- Stress testing has a high NPV (90-100%)
- Exercise testing is preferred if possible (functional status)
Dyspnea of unknown origin
Patients with current or prior HF with worsening dyspnea or other changes in clinical status
Suspected valvular heart disease
Potential recommendations after risk estimation and medical evaluation

- Proceed with surgery accepting cardiac risk
- Postpone surgery for medical stabilization
- Postpone surgery for CV testing or intervention
- Change surgery to lower risk procedure or non surgical alternative
Summary Recommendations
Part 2
• **Class I:** Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective

• **Class IIa:** Weight of evidence/opinion is in favor of usefulness/efficacy

• **Class IIb:** Usefulness/efficacy is less well established by evidence/opinion but may be helpful

• **Class III:** Conditions for which there is evidence and/or general agreement that the procedure/treatment is not useful/effective and in some cases may be harmful
• **LOE A**: Recommendation based on evidence from multiple randomized trials or meta-analysis
• **LOE B**: Recommendation based on evidence from a single randomized trial or multiple nonrandomized studies
• **LOE C**: Recommendation based on expert opinion, case studies, or standards of care
Step 1
Need for emergency non cardiac surgery
- Yes (Class I, LOE C)
  - Operating Room
  - Perioperative Management
- No

Step 2
Active cardiac condition
- Yes (Class I, LOE B)
  - Evaluate and treat per ACC/AHA guidelines
- No

Step 3
Low risk surgery
- Yes (Class I, LOE B)
  - Proceed with planned surgery
- No

Step 4
Functional capacity greater than or equal to 4 METS without symptoms
- Yes (Class IIa, LOE B)
  - Proceed with planned surgery

Step 5
No or unknown
- 3 or more clinical Risk factors
  - Consider testing if it will Change management
- 1 or 2 clinical Risk factors
  - Proceed with planned surgery with HR control (Class IIa, LOE B) or consider non invasive testing (Class IIb, LOE B) if it will Change management
- No risk factors
  - Proceed with surgery

Class I, LOE B
Summary Recommendations
Part 3
AND WHAT MADE YOU THINK YOU COULD BEAT ROCK?
Emergent surgery … carries ↑ risk of complications for any baseline risk level….

- In general benefits of proceeding with emergent surgery outweighs risk

- Primary goal is supportive post-op care
In **Low risk patients** (<1%) → no new CV testing indicated
If a patient is clinically stable, and can perform > 4 METS of activity → no additional testing is indicated regardless of RCRI score
- In intermediate risk patients . . . Consider further testing only if it is indicated even if patient is not having surgery
- There is little evidence that prophylactic interventions improves surgical outcomes

- **No** study has shown that intervention based on preoperative testing improves outcome
Post-operative Evaluation

- Review of anesthesia record
- Review SXS, Vitals, P.E.
- Review Labs
- Review Post-op ECG (Selected)
What about Cardiac Troponins?
Troponin I and T are ultra sensitive and are a non specific markers and are often elevated in other processes:

- Liver and renal disease
- Pulmonary embolus
- Trauma
Can’t Dx an M.I. with Troponin alone
Acute MI definition:
Rise of troponins (above 99th percentile) and:

• Ischemic symptoms or
• Ischemic ST changes or
• New Q waves or LBBB or
• Imaging evidence of loss of viable myocardium or
• New WMA or
• Thrombus on angiogram
2012 Joint task force ACC, AHA, ESC, WHF developed universal definition of MI and classified 5 types:

• Type 1: Plaque rupture/thrombosis

• Type 2: Oxygen supply and demand mismatch
Both type 1 and 2 can occur peri-op

- Type 2 can be caused by anesthesia stressors, tachycardia, anemia, pain, catecholamines, cortisol, HTN or vasoconstriction

- Type 1 can be caused by plaque rupture and/or be precipitated by any of the above
Which patients should have post-op troponin testing?

ACC/AHA Guidelines:

Class I: Signs/symptoms of ischemia or MI

Class IIb: Patients at high risk but without findings

Class III: Routine screenings of all patients
(Due to lack of validated treatment strategies which modify outcome)
Troponin take home message

• Routine screening is not helpful

• Often elevated in low risk patients

• Even in high cardiovascular risk patients, (+) troponin is associated with more non-vascular deaths than vascular deaths

• Therefore troponin is a non specific marker for adverse events
Thank You
“To prevent a heart attack, take one aspirin every day. Take it out for a run, then take it to the gym, then take it for a bike ride...”