Preoperative Evaluation of Patients Undergoing Noncardiac Surgery

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Learning Objectives

• Use a risk prediction tool for predicting a patient’s risk of perioperative major adverse cardiac events.

• Understand the evidence-based guidelines applicable to the preoperative evaluation of patients undergoing noncardiac surgery.
Preoperative risk evaluation is one of the most common reasons patients are referred to general medicine practitioners\(^1\)

Accurate identification of patients at high risk for major adverse cardiac events may reduce perioperative morbidity and mortality

Accurate identification of low risk patients can reduce:
- unnecessary, low-value testing and procedures
- delays in proceeding to surgery
48yo woman scheduled for an elective laparoscopic cholecystectomy. She has no h/o CAD, CHF, CKD, or DM. She regularly “horses around” with her 2 young children and jogs 2 miles 3x per week. Physical exam is notable only for a BMI of 31. For preoperative testing, you order:

A) EKG
B) Tread mill Stress test
C) Transthoracic echocardiogram
D) no additional tests
68yo woman is in the ED after mechanical fall and L hip fracture. She has insulin-dependent DM but does not have regular outpatient medical follow-up. She rarely exerts herself beyond light housework and gets short of breath while grocery shopping. Physical exam is notable for obesity, L hip pain with limited ROM, bibasilar inspiratory crackles. The orthopedic surgeons are asking for preop clearance, after telling them you don’t “clear” patients, you recommend prior to surgery:

A) EKG and BMP
B) transthoracic echocardiogram (TTE)
C) nuclear medicine stress test
D) TTE and nuclear medicine stress test
E) proceeding to surgery w/o additional testing
ACC/AHA Evidence Grading

Class: “How good is this treatment”

- **Class I:** benefits greatly outweigh risks
  - “treatment SHOULD be administered”

- **Class II:** benefits outweigh risks
  - IIa: “IT IS REASONABLE to administer the treatment”
  - IIb: “treatment MAY BE CONSIDERED”

- **Class III:** no benefit or harm
ACC/AHA Evidence Grading

Level: “How robust were the studies that gave rise to the data?”

• **Level A:** data derived from multiple randomized clinical trials (RCTs) or meta-analyses

• **Level B:** data derived from a single RCT or nonrandomized studies

• **Level C:** consensus opinion, case studies, or *de facto* standard of care
Urgency of Surgery

- If surgery is an emergency, proceed to OR
- Even if not a true surgical emergency, timeframe for surgical intervention should always be part of preoperative planning
  - Hip fracture repair (72 hours)
  - Cancer surgery (~few weeks?)
- **When in doubt, talk it out**
  - If uncertain how much time may be available until surgery must be done, speak with the surgeon
Acute Coronary Syndromes

- Current unstable angina → delay surgery\(^1\)
- MI (regardless of revascularization)
  - Wait at least 60 days\(^{1,2}\)

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Use a Risk Prediction Tool

- **Recommendation:** “A validated risk-prediction tool can be useful in predicting the risk of perioperative major adverse cardiac outcomes (MACE) in patients undergoing noncardiac surgery.” **Class IIa, Level B**
Using a Risk Prediction Tool: 
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Revised Cardiac Risk Index
*

- easiest-to-use validated tool for predicting perioperative risk of MACE
- 6 predictors of risk
- 0 or 1 predictors $\rightarrow$ low risk
- $\geq 2$ predictors $\rightarrow$ elevated risk
- also provides more detailed estimated risk of MACE
Using a Risk Prediction Tool: 
*Revised Cardiac Risk Index*

1. **high risk surgery**
   - intrathoracic
   - intraperitoneal
   - suprainguinal vascular

2. 0 predictors = 0.4%

3. **history of ischemic heart disease**
   - history of MI
   - history of positive stress test
   - current anginal chest pain
   - current nitrates use
   - pathologic Q waves

4. 2 predictors = 6.6%

5. **history of congestive heart failure**

6. **history of cerebrovascular disease (stroke or TIA)**

7. **insulin-dependent diabetes**

8. **pre-operative creatinine >2mg/dL**

≥3 predictors = >11%
Using a Risk Prediction Tool: 
ACS Surgical Risk Calculator

- validated using prospectively collected data from >1 million operations at >500 US hospitals
- uses CPT code of planned surgery for more accurate assessment of risk associated with the specific surgery
- provides risk estimates not only MACE, but also overall mortality, several other clinically important outcomes:
  - PNA
  - surgical site infection
  - VTE
  - renal failure
  - discharge to a SNF
- more cumbersome to use
Low Risk Patients: Recommendation

“For patients with a low risk of perioperative MACE, further testing is not recommended before the planned operation.” Class III, Level B
Determining a patient’s functional capacity – metabolic equivalents (METs) – provides further stratification of elevated risk patients

• 1 MET:
Elevated Risk Patients: Determine Functional Capacity

- **>10 METs**: excellent functional capacity
  - exercise

- **4-10 METs**: moderate-good functional capacity
  - climbing stairs
  - fast walking on level ground
  - heavy work around the house

- **<4 METs**: poor functional capacity
Elevated Risk Patients: Stressing over the Stress (Test)

- “For patients with elevated risk and excellent functional capacity (>10 METs), it is reasonable to forgo further exercise testing with cardiac imaging and proceed to surgery.” Class IIa, Level B

- “For patients with elevated risk and moderate to good functional capacity (4-10 METs), it may be reasonable to forgo further exercise testing with cardiac imaging and proceed to surgery” Class IIb, Level B

- “For patients with elevated risk and poor (<4 METs) or unknown functional capacity, it may be reasonable to perform exercise testing with cardiac imaging to assess for myocardial ischemia if it will change management” Class IIb, Level C

- “Routine screening with stress testing is not useful for patients at low risk.” Class III, Level B
Revascularization for Elevated Risk Patients: the Recommendations

- A positive stress test WOULD impact the operative plan and the patient has a positive stress test. Now what . . .?

- “Revascularization before noncardiac surgery is **recommended** in circumstances in which revascularization is indicated according to existing clinical practice guidelines.” **Class I, Level C**

  **BUT . . .**

- “It is **not recommended** that routine cardiovascular revascularization be performed exclusively to reduce perioperative cardiac events.” **Class III, Level C**
Revascularization for Elevated Risk Patients: 
Say that Again??

- **Class I**: IF, in the course of your preoperative evaluation, you identify a patient who has an indication for revascularization, then revascularization is recommended

- **Class III**: Revascularization is NOT recommended just to reduce the patient’s perioperative risk
When Would I Stress Test

- Symptoms of cardiac disease **AND** non-urgent surgery
- MACE risk ≥1%, poor functional capacity, elective surgery **AND** clear plan for how results will be used

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“It’s not looking good. His pulse is up to 202 just from getting out of the chair and stepping on to the treadmill.”

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When Would I **NOT** Stress Test
(Even Though the Algorithm Suggests It)

- Coronary evaluation within past year **AND** no cardiac symptoms since
  - Coronary angiography without significant obstructive CAD
  - Coronary CT angio without significant obstructive CAD
  - Stress test with no ischemia

- Coronary revascularization within past year **AND** no cardiac symptoms since
Case 1

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Case 2

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Summary

1) Use a risk assessment tool to determine patient’s risk of major adverse cardiac events (MACE)

2) Determine your patient’s functional capacity
   - low risk patients AND elevated-risk patients with moderate/good/excellent functional capacity . . . proceed to surgery w/o additional testing

5) stress testing and consider revascularization in elevated-risk patients with poor functional capacity *IF it will change the operative course*
• Involve your surgical colleagues when considering further testing for elevated risk patients

• *Before ordering preoperative cardiac testing, consider that there is NO strong data that revascularization reduces short- or long-term postoperative adverse outcomes
Thank You