Cardiac Risk Assessment in the Preoperative period

Catherine Curley, MD
May, 2017

Disclosures

I am not a cardiologist!
Case 1

- 78 yo man presenting to the ED after mechanical fall on his driveway. Found to have a hip fracture. You are called by orthopedic surgery to “clear him” for surgery.
- You see the patient in the ED. His family has just left. The patient is a bit sleepy having just received pain medication. He tells you that he has a doctor at Parma Hospital. He reports a medical history of diabetes, HTN, and a pacemaker. He denies recent hospitalizations.
- ED recorded the medication list as follows:
  - Metformin 500mg twice daily
  - Glipizide 5 mg twice daily
  - Glargine insulin 20 u at bedtime
  - Toprol xl 100mg daily
  - Lisinopril 5 mg daily
  - Aspirin

Approach to each patient

- What is the risk of cardiac complications (MI, death) of surgery in this patient?
  - Do I have all the information I need?
  - Do I need additional testing to clarify risk? (Echo, Stress test, Cardiac Catheterization)
- Can I modify the risk for this patient?
  - Medical management?
  - Revascularization?
  - Delay surgery
  - Cancel the surgery altogether
1. We can define risk:
   - 1977: Goldman published “Multifactorial Index of Cardiac Risk in Noncardiac Surgical Procedures” which highlighted predictors of post op cardiac complications and death
     - Recent MI (within 6 months)
     - Physical exam findings of CHF (S3, rales)
     - ECG findings
     - Type of surgical procedure
   - Evolution of the original Goldman Criteria to most current Risk calculators:
     - Revised Cardiac Risk Index (RCRI) (Reference #1)
     - National Surgical Quality Improvement Program (NSQIP) (Reference #2)
American College of Surgeons
National Surgical Quality Improvement Program

- The risk calculator was built using data collected from > 2.7 million operations from 586 hospitals participating in ACS NSQIP from 2010-14
- Used 20 patient characteristic and the CPT code for the surgery
- Calculates risk for cardiovascular complications as well as other surgical complications
Literature continued

2. We can do something about it. (or not)

**Revascularization:**
CARP trial (Coronary Artery Revascularization before Elective Major Vascular surgery) 2004
- 5000+ vascular surgery patients
- Randomized to revascularization (PCI or CABG) versus medical management
- 30 day mortality about 3% in both groups. Post op MI similar both groups
- 3 year mortality about 22% both groups

**Medical Management:**
Aspirin, statin, B blockers should be continued
See next slide regarding B blockers

---

**B blockers**
*(long story so here are the Cliff Notes)*

- Numerous studies showing benefit from use of B blockers in patients with CAD in the perioperative period, especially when started well before surgery
- If good for them then good for all?? (1990’s vie)
- Observational data (2000’s) suggests no benefit and maybe harm to low risk patients
- POISE Trial: 8000+ patients, randomized to high dose XL metoprolol 2-4 hours prior to surgery. Results: few MI but more stroke and death.

**BOTTOM LINE:**
- Continue B blockers if already on them. Initiate B blockers only in very high risk persons and at least 10 days prior to surgery.
Back to our patient

- Hip fracture
  - Urgent surgery, ideally done within 24 hours
  - Intermediate risk procedure
- Medical History of: DM, HTN and “pacemaker”.

Further History

- You interview the patient. He is a bit more awake. He tells you that he is feeling OK except for the hip pain. No chest pain, SOB, PND or orthopnea.
- He denies MI. Does not think he has every had a cardiac catheterization. Might have had a stress test 10 years ago. Knows he has a pacemaker and follows with a cardiologist, most recently about 3 months ago.
- Reports he has significant OA of the knees and this limits his activities. He can walk on the level and does some light housework, but his children have taken over the lawn care and shoveling in the past year. Avoids stairs due to knee pain.
- Labs: mild anemia, normal BMP
- ECG: NSR, normal ECG (not paced)
2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery

Right now does he have:
- Unstable angina, ACS?
- Acute CHF?
- Unstable arrhythmia?
- Severe Valvular disease?

How do I know?
- H and P, ECG.
This is where we use: RCRI or NSQIP

Our patient:
RCRI
History CAD? No
CHF? No
DM on insulin? Yes
CKD Cr >2? No
Stroke? No
High risk surgery? No
RCRI 1= 0.9% risk of MACE

Cardiac Risk Assessment Summary

- You determined that the patient is at Low Risk of MACE based on his history.
- You write in the chart: “The patient is at low risk of cardiac complications of surgery. He is medically optimized for this surgery”.

MetroHealth and Case Western Reserve University, affiliated since 1914, partners in advancing patient care through research and teaching.
What is his functional capacity (and why do I care?)

- Functional capacity is a surrogate for the stress of surgery.

### Table 3. Measures of Functional Status

<table>
<thead>
<tr>
<th>Category</th>
<th>Example Activities</th>
</tr>
</thead>
</table>
| <4 METs  | - Eat, dress, and use the toilet  
|          | - Walk indoors around the house  
|          | - Walk 1 or 2 blocks slowly (2-3 mph)  
|          | - Do light work around the house |
| ≥4 METs  | - Walk 4 mph or faster on level ground  
|          | - Climb a flight of stairs  
|          | - Walk up a hill  
|          | - Run a short distance  
|          | - Do heavy work around the house  
|          | - Golf  
|          | - Doubles tennis |

MET = metabolic equivalent.
Are there additional issues to cover in your assessment?

• Pacemaker
  – Make clear in your note there is a pacemaker
  – Determine Make and model
  – Determine if pacemaker dependent (if possible)
  – Obtain records of any recent pacemaker checks if possible
  – Suggest EP in AM for pacemaker recommendations

• Diabetes

• HTN

Case continued

• Post op day 3 the patient feels a bit SOB. The astute intern notes that the patient is tachycardic and has bilateral faint basilar rales and requests a new set of vitals:
  – P: 140, BP 120/76, R 18, Pulse ox 93% on RA
Case 1 continued: What’s going on?
A. Atrial fibrillation with RVR
B. Pulmonary embolism
C. Pneumothorax
D. Deconditioning
Case continued

- ECG demonstrates atrial fibrillation with RVR
- On review of the MAR you realize his Toprol has been held since surgery.
- Rapid response called. He is given a dose of IV metoprolol and transferred to cardiac telemetry for further treatment.

Post operative Atrial fibrillation

- Seen in 3-10% of non cardiac surgery patients who are hospitalized post op
- Usually occurs between hospital day 1-3. Uncommon after POD 6

The denominators are 1503 patients for postoperative AF.
Post op Atrial fibrillation continued

- Risk factors for post op atrial fibrillation
  - Age
  - Male gender
  - History of A fib
  - HTN
  - CHF
  - Withdrawal of B blocker therapy
- Prevention of Post Op Atrial fibrillation
  - B Blockers or amiodarone suggested in the CARDIAC surgery population.
  - In non cardiac surgery patients no proven therapy.

References


2. **NSQIP:** Karl Y. Bilimoria, Md, Ms, Facs Email Address, Yaoming Liu, Phd, Jennifer L. Paruch, Md, Lynn Zhou, Phd, Thomas E. Kmiecik, Phd, Clifford Y. Ko, Md, Ms, Mshs, Facs, Mark E. Cohen, Phd. Development and Evaluation of the Universal ACS NSQIP Surgical Risk Calculator: A Decision Aide and Informed Consent Tool for Patients and Surgeons. Journal of the American College of Surgeons, July 2013
