Update in Perioperative Medicine

Know When to Hold ‘Em

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Learning Objectives

• Cardiovascular risk
  – Risk assessment
  – Beta-blockers
  – Antiplatelet management
  – Postoperative MI surveillance

• Pulmonary risk
  – Obstructive sleep apnea
You are seeing 4 patients in clinic prior to undergoing a total hip replacement. Each has a single cardiovascular condition. Which has the highest risk for postoperative mortality?
A) Atrial fibrillation
B) Nonischemic CHF
C) Ischemic CHF
D) CAD

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Other CV Disease Predicting Perioperative Mortality

- Most literature has focused on CAD as the primary source of perioperative CV complications
- Previous hints that other CV disease may contribute even more:
  - In some cardiac risk index derivations, CHF carried higher odds ratio than CAD

Population-based cohort study using administrative databases
- Assessed >38,000 patients with 4 CV conditions:
  - AFib
  - Nonischemic CHF
  - Ischemic CHF
  - CAD
- Primary outcomes: 30-day mortality & rehospitalization

CHF and Afib as Perioperative Risk Predictors

- Also found surprisingly high 30-day mortality for minor and outpatient surgeries:
  - CAD: 0.8%
  - AFib: 2.2%
  - CHF: ~4.5%

- Risk was highest if CV event within 4 weeks before surgery
CHF & AFib as Predictors

BOTTOM LINE

• Take a history of CHF and Afib as seriously as CAD – may predict all-cause mortality
• Optimize CHF/AFib treatment prior to surgery
• Avoid surgery within 4 weeks of a cardiovascular event

Perioperative Beta-Blockade Update

• Unfortunately no new trial data; only this...
Perioperative Beta-Blockade

- Data from Poldermans’ published work (the DECREASE trials) had a large influence on guidelines for perioperative beta-blockade
- Since this news, many experts have commented vigorously about what to do with the data

Recent meta-analysis compared all studies other than DECREASE and found that beta-blockers were associated with decreased MI but also with increased stroke and increased mortality
- Where do we go from here?!

Perioperative Beta-Blockade

Non-DECREASE trials had two fundamental problems:

- Beta-blockers started immediately (1 day) before surgery
- No titration (and often large doses used)

Beta Blocker Withdrawal

Fig. 2. Kaplan-Meier estimate of 1-year all cause mortality, stratified according to the use of beta-blockers.

Perioperative Beta-Blockade

Beta blockers **should be continued** in patients undergoing surgery who are receiving beta blockers for treatment of conditions with ACCF/AHA Class I guideline indications for the drugs. *(Class I recommendation with Level of Evidence C)*


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Perioperative Beta-Blockade

- For patients who otherwise have a long-term indication for beta-blockade, consider starting it **well** ahead of time
- How long?
Timing of Beta Blocker Initiation Before Surgery

- 940 vascular surgery patients
- New preop beta blockers

<table>
<thead>
<tr>
<th>Timing of BB initiation before surgery</th>
<th>0-1 wk (n=158)</th>
<th>&gt;1-4 wks (n=393)</th>
<th>&gt;4 wks (n=389)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median HR (day of surgery)</td>
<td>74</td>
<td>70</td>
<td>66</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>30-d CV events (trop/mort/CVA)</td>
<td>27%</td>
<td>15%</td>
<td>16%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Long-term mortality</td>
<td>19%</td>
<td>14%</td>
<td>15%</td>
<td>0.039</td>
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</table>

Perioperative Beta-Blockade

BOTTOM LINE

- For patients already on beta-blockers, be sure they remain on them uninterrupted
  - Including when they are NPO
- For patients with a long-term indication for beta-blocker therapy, start them but at least a couple weeks before surgery
  - What if surgery is scheduled for next week?

75 y/o man presents with newly diagnosed colorectal cancer. In order to obtain a surgical cure, colectomy is planned in 3 weeks. His PMH is significant for CAD with 3 drug eluting stents placed 6 months ago, HTN, DM, CKD and hyperlipidemia. He has had no recent cardiopulmonary symptoms. His exam is unremarkable. His medications include clopidogrel, aspirin, atorvastatin, atenolol, amlodipine and metformin.

What do you advise for perioperative antiplatelet management?

A. Stop aspirin and clopidogrel 7 days preop
B. Continue aspirin and clopidogrel uninterrupted
C. Stop clopidogrel 5-7 days preop, continue aspirin
D. Delay surgery for 6 months because antiplatelet therapy interruption is not advised
# Perioperative Antiplatelet Guidelines

Limited & largely based on expert consensus

<table>
<thead>
<tr>
<th>Organization</th>
<th>Recommendations</th>
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| **ACC/AHA**  | **Previous PCI:**  
|              | • avoid surgery <4 weeks after PTA without stent, <4-6 weeks after BMS, <1 year after DES (Class III, LOE: B)  
|              | • continue dual antiplatelet therapy if surgery needed inside these timeframes (consensus)  
|              | • outside these times, consider continuing dual antiplatelet therapy & if not possible continue ASA perioperatively (consensus)  |
| **ACCP**     | **Previous PCI:**  
|              | • continue ASA and clopidogrel perioperatively if surgery needed <6 weeks after BMS or <6 months after DES (Grade 1C) |

Fleisher LA et al. JACC. 2007;50(17):159-241.  
• Database cohort study
• ~8000 patients with coronary stenting within 10 years who underwent surgery
• Compared to >300,000 surgical patients without coronary stenting
• Primary outcome: 30-day mortality, readmission for acute coronary syndrome or repeat cardiac catheterization

Conclusions

- Newer generation stents and techniques may account for shortened window of risk for DES
- Safe to discontinue clopidogrel (while continuing aspirin) 45 days after BMS and 6 months after DES

Evidence for Safety of Continuation of Antiplatelet Therapy

- For many types of surgery, studies indicate aspirin and clopidogrel alone or in combination appear to be safe
  - Some show increased surgical blood loss/transfusion
  - No increase in mortality/surgical failure
- Notable exceptions include:
  - Intracranial
  - Medullary canal (spine)
  - TURP (other than laser)
  - Posterior eye chamber

**Continuing Dual Antiplatelet Therapy vs. Aspirin alone**

- Do not assume dual antiplatelet therapy must be stopped – when in doubt, discuss with surgeon
- Consider continuing both (with discussion with surgeon) if risk factors for stent thrombosis:
  - renal insufficiency
  - DM
  - multiple stents
  - proximity to vessel bifurcation
  - older generation stents


**Perioperative Antiplatelet Therapy in Patients with Coronary Stents**

**BOTTOM LINE**

- No elective surgery for 14 days after PCI without stenting, 6 weeks after BMS, 6 months after DES
- Discuss with surgeon benefits vs. risks of continuing chronic dual antiplatelet therapy
- **Continue aspirin** unless bleeding risk too high

68 y/o man with a PMH of CAD (s/p 3-vessel CABG – proximal LAD/LCx/RCA), HTN, type 2 DM and PAD is scheduled to undergo a AAA repair in 2 weeks. He has been in reasonably good health with good control of his DM (A1c 6.9%) but a very poor exercise tolerance due to morbid obesity and severe OA. He is on atenolol, simvastatin, ASA and glyburide. His baseline examination and labs are unremarkable. HR was 60 and LDL was 68.

He had a preoperative nuclear medicine stress test which showed a small reversible defect in the inferior wall. He was evaluated by his cardiologist who advised no intervention since the defect was likely consistent with coronary occlusion downstream of his previous RCA bypass.

Which of the following would you advise for cardiac monitoring after surgery?

A) Standard cares only
B) Troponin and ECG on postop day 1 and 2
C) Troponin and ECG on postop day 1
D) ECG on postop day 1 and 2
Postoperative Cardiac Ischemia Surveillance

- In the ACC guidelines, postop cardiac enzymes & ECG only recommended for patients with signs or symptoms of CV dysfunction
- Recent studies suggest the incidence of elevated troponins & silent MI may be more common and more serious than thought

Fleisher LA et al. JACC. 2007;50(17):159-241.

Postoperative Troponin & All-Cause Mortality

VISION Study

- Prospective cohort study of ~15,000 patients undergoing noncardiac surgery
  - 25% of patients age ≥75
  - 20% ortho, 20% general surgery, 39% low-risk surgery
- Roche 4th-generation Elecsys TnT assay 6 to 12 hours postoperatively and on the first, second, and third days after surgery
- Primary outcome was mortality at 30 days after surgery

VISION Study

- 30-day mortality rate was 1.9% (282 deaths; 95% CI, 1.7%-2.1%)
- 26.6% of deaths occurred after hospital discharge (median time from discharge to death was 11.0 days)

### Risk Factors Predictive of CV Risk

<table>
<thead>
<tr>
<th></th>
<th>Adjusted Hazard Ratio</th>
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<tbody>
<tr>
<td>CHF</td>
<td>1.60</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>65-74</td>
<td>1.67</td>
</tr>
<tr>
<td>≥75</td>
<td>3.03</td>
</tr>
<tr>
<td>CVA</td>
<td>2.01</td>
</tr>
<tr>
<td>PVD</td>
<td>2.13</td>
</tr>
<tr>
<td>COPD</td>
<td>2.15</td>
</tr>
<tr>
<td><strong>Major vascular surgery</strong></td>
<td>2.38</td>
</tr>
<tr>
<td><strong>Active cancer</strong></td>
<td>2.38</td>
</tr>
<tr>
<td>Recent coronary syndrome</td>
<td>3.12</td>
</tr>
<tr>
<td><strong>Major general surgery</strong></td>
<td>3.25</td>
</tr>
<tr>
<td><strong>Major neurosurgery</strong></td>
<td>3.72</td>
</tr>
<tr>
<td>Urgent/emergent surgery</td>
<td>4.62</td>
</tr>
<tr>
<td><strong>Troponin</strong></td>
<td></td>
</tr>
<tr>
<td>0.02</td>
<td>2.41</td>
</tr>
<tr>
<td>0.03-0.29</td>
<td>5.00</td>
</tr>
<tr>
<td>≥0.30</td>
<td>10.48</td>
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### VISION Trial – Putting the Stats into Context

- 41% of all postop deaths associated with elevated troponin
- Risks of death based on troponin:
  - 0.02 → 1 in 25 die within 30 days
  - 0.03-0.29 → 1 in 11 die
  - ≥0.30 → 1 in 6 die

VISION Trial – Limitations

- No preop troponin to compare to
- Correlation with other troponin assays?
- Timing of patient recruitment (preop or postop) not captured
- No information on any management induced by troponin elevation

Postoperative MI Surveillance

NOW WHAT?
- We can’t pretend that asymptomatic troponin elevations are meaningless
- What do we do with them?
- Who should we check them in?
- How bad does this make our heads hurt?
Why It’s Important

Patient’s meeting criteria for MI deserve treatment for MI
- Aggressive antiplatelet therapy
- Beta-blockade
- Statin therapy
- ACE-inhibitor if LV dysfunction
- Possible anticoagulation

Why It’s Important

- Small study has suggested that these therapies were infrequently provided to patients with postop MI
- Same study showed evidence that those who received them had better outcomes than those who didn’t

Postoperative MI Surveillance

BOTTOM LINE

• Diagnosing postop MI matters
• Consider postoperative serial (at least daily for 2 days) ECG/troponin in these situations:

<table>
<thead>
<tr>
<th>High-Risk Surgery</th>
<th>High-Risk Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Emergency</td>
<td>• Poor functional capacity</td>
</tr>
<tr>
<td>• Vascular</td>
<td>+</td>
</tr>
<tr>
<td>• Extended duration (&gt;3 hrs)</td>
<td>• Multiple risk factors: CAD, CVD, CKD, CHF, DM, elderly</td>
</tr>
<tr>
<td>• Large blood loss</td>
<td></td>
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To Sleep, Perchance to Never Wake Up

54 y/o obese man with a PMH of HTN and type 2 DM presents for preop evaluation before undergoing left knee replacement. He reports no symptoms other than left knee pain. He admits to constant daytime fatigue and waking his bed partner up with his snoring. His BMI is 42 kg/m² and his measured neck circumference is 45 cm.

Which of the following is the best perioperative management plan for this patient?

A) Delay surgery & refer to sleep medicine
B) Proceed with surgery with no additional planning
C) Proceed with surgery with plan for continuous postoperative oxygen therapy at 2 L/min
D) Proceed with surgery with plan for postoperative auto-PAP and continuous pulse oximetry
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OSA & Increased Postoperative Complications

• Infections  
• Respiratory failure  
• Hypoxia  
• ICU use  
• Cardiac events  
• GI bleeding  

• Not identified by current indices/calculators because these were developed with databases that did not include data entry fields for this

OSA – When to Suspect

- Daytime somnolence
- Dyspnea or chest pain
- Crowded oropharynx
- Obesity
- Men > age 50

- **For consistency use OSA screening questionnaire**
  - Several available: STOP-BANG, Berlin, ASA checklist
  - ASA now advises use of STOP-BANG


STOP-BANG Questionnaire

- **Snoring:** *Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?*
- **Tiredness:** *Do you often feel tired, fatigued, or sleepy during daytime?*
- **Observed apnea:** *Has anyone observed you stop breathing during your sleep?*
- **Pressure:** *Do you have or are you being treated for high BP?*
  - BMI >35 kg/m 2
  - Age >50 yrs
  - Neck circumference > 40 cm
  - Gender = male

**OSA Screening Questionnaires**

STOP
- High risk of OSA if score $\geq 2$
- Increased postop pulmonary complications if score $\geq 2$

STOP-BANG
- High risk of moderate-severe OSA: score $\geq 5$
- High risk of OSA: score $\geq 3$


**Perioperative Management for Suspected or Confirmed OSA**

- If patient is high risk & urgency of surgery does not preclude, pursue formal diagnosis & initiation of appropriate therapy
- If no time for this, proceed with same precautions as patient with known OSA plus possible empiric PAP therapy

Intraoperative Management
- Consider regional anesthesia/peripheral nerve block
- Prepare for difficult airway management
- Extubate only after completely awake & reversed

Postoperative Management
- Continuous oxygen saturation
- Maintain head of bed at 30 degrees
- PAP – use home or start auto-PAP if high risk
  - Wear whenever sleeping – day or night
- Arrange formal sleep study on discharge

**OSA & Surgery**

**BOTTOM LINE**
- OSA is definitely associated with increased perioperative risk
- Patients need to be counseled on these risks
- Surgical team needs to take this into account – anesthesia, OR location, disposition
- Pursue evaluation of high-risk patients prior to surgery when possible

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**Parting Shots**

- Surgery is risky
  - Even when we can’t provide further risk reduction, patients need to be counseled on potential for negative outcomes
- Don’t be afraid to speak up
  - The road to perdition is paved with assumptions
- Do what’s right for the non-periop situation
THANK YOU