Updates in Perioperative Medicine

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Disclosures

- Discussion of non-FDA approved indications
- No non-FDA approved therapies discussed
- No financial ties to industry

Updates in Perioperative Medicine

New Guidelines for Perioperative Care:
- Coronary stents in surgical patients
- Bridging anticoagulation in atrial fibrillation
- Evaluating patients with sleep apnea

New Studies on Old Problems:
- Medical management of cardiac risk (statins)
- Opiates use after surgery
A 63-y.o. man needs a hemicolectomy for colon cancer. He had a drug-eluting stent placed 4 months ago for stable angina.

What do you recommend?
1. Operate now
2. Operate now only if DAPT can be continued
3. Wait 6 months after DES placed
4. Wait 12 months after DES placed

Perioperative Cardiac Complications in Patients with Coronary Stents

Question: How do stent type and time until surgery affect risk of cardiac complications?

Study Design: Retrospective cohort analysis
- Over 25,000 pts who had noncardiac surgery between 6 weeks & 2 years after BMS or DES placement
- Identify risk factors for cardiac complications (all-cause mortality, MI, revascularization)


Effect of Stent Type & Time After Implantation

Time of surgery after PCI didn’t matter after first 6 months

2016 ACC/AHA Guidelines for DAPT

• Avoid PCI if antiplatelet drugs will need to be held prematurely
• Delay elective surgery after elective PCI:
  - Bare metal stent: 30 days
  - Drug eluting stent: 6 months (optimal)
    3 months (if harm in delay)
• Continue or restart antiplatelet agents (especially ASA) as soon as possible, unless bleeding risk precludes


Managing Perioperative Anticoagulation

Two patients on warfarin therapy are scheduled for elective hip arthroplasty. You’re asked whether they should receive perioperative bridging anticoagulation (with enoxaparin):
• One patient has atrial fibrillation due to hypertension
• The other patient has a St. Jude mechanical AVR
• Neither has any other relevant comorbidity
1. Bridge for AVR only
2. Bridge for AF only
3. Bridge for both
4. Bridge for neither

BRIDGE Trial

Patients:
• 1884 patients on warfarin for atrial fibrillation
• CHADS-2 score ≥ 1
• Excluded patients with mechanical valve or stroke within 12 weeks and cardiac & neurologic surgery
Intervention:
• Randomized to bridging with LMWH or placebo
Outcome:
• 30-day risk of arterial thromboembolism & bleeding

Douketis JD et al. NEJM. 2015; 373:823-33.
BRIDGE Trial

<table>
<thead>
<tr>
<th></th>
<th>Bridged</th>
<th>No Bridge</th>
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</thead>
<tbody>
<tr>
<td>Embolic Event</td>
<td>0.3%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Major Bleeding</td>
<td>3.2%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Minor Bleeding</td>
<td>21%</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NNH = 53</td>
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<tr>
<td></td>
<td></td>
<td>NNH = 12</td>
</tr>
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</table>

Douketis JD et al. NEJM, 2015; 373:823-33

BRIDGE Trial for Atrial Fibrillation

Conclusions:
- Bridging did not reduce risk of embolism
- Bridging increases bleeding risk

Caveats:
- Few patients with high CHADS-2 score (mean = 2.3)

My take-away:
- Don’t bridge majority of atrial fibrillation
- Carefully consider bridging if stroke risk is very high
  (CHADS-2 score 5 or 6, rheumatic atrial fibrillation)

What About Mechanical Valves?

![Graph showing thromboembolic risk with and without anticoagulation for atrial fibrillation and mechanical valve](image)
Effect of Mechanical Valve Location & Design on Thromboembolic Risk

Valve Location:
- Aortic: RR = 1.0
- Mitral: RR = 1.8

Valve Design:
- Caged Ball: RR = 1.0
- Tilting Disk: RR = 0.7
- Bi-leaflet: RR = 0.6


Perioperative Anticoagulation:
2012 ACCP Guidelines (9th Edition)

<table>
<thead>
<tr>
<th>Atrial Fib.</th>
<th>Mechanical Valve</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHADS2 = 5-6; recent CVA; rheumatic AF</td>
<td>Any MVR; older (caged-ball or tilting disc) AVR; recent CVA</td>
<td>Bridge with heparin</td>
</tr>
<tr>
<td>CHADS2 = 3-4</td>
<td>Bileaflet AVR plus other stroke risk factor(s)</td>
<td>???</td>
</tr>
<tr>
<td>CHADS2 = 0-2</td>
<td>Bileaflet AVR without AF or other stroke risk factor</td>
<td>No heparin bridge</td>
</tr>
</tbody>
</table>

Perioperative Anticoagulation:
My Approach after BRIDGE Trial

<table>
<thead>
<tr>
<th>Atrial Fib.</th>
<th>Mechanical Valve</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHADS2 = 5-6; recent CVA; rheumatic AF</td>
<td>Any MVR; older (caged-ball or tilting disc) AVR; recent CVA</td>
<td><strong>Consider bridging</strong></td>
</tr>
<tr>
<td>CHADS2 = 3-4</td>
<td>Bileaflet AVR plus other stroke risk factor(s)</td>
<td><strong>No bridge</strong></td>
</tr>
<tr>
<td>CHADS2 = 0-2</td>
<td>Bileaflet AVR without AF or other stroke risk factor</td>
<td><strong>No bridge</strong></td>
</tr>
</tbody>
</table>
ACC Guideline for AF (2017)

General considerations:
- Continue anticoagulation if procedure has low or negligible bleeding and patient’s bleeding risk is normal
- No bridging needed with DOACs

Bridging decision based on both clotting & bleeding risk:
- CHA2DS2-VASc: 1-4 = low risk; 5-6 = mod; 7-9 = high
- Bleeding risk: elevated if major bleed or ICH < 3 mo, platelets low or abnormal, aspirin use, supratherapeutic INR, or prior bleeding with bridging or similar surgery

Doherty et al. JACC, 2017; 69(7): 871–898

ACC Guideline for AF (2017)

<table>
<thead>
<tr>
<th>High Thrombotic Risk</th>
<th>Normal Bleeding Risk*</th>
<th>Elevated Bleeding Risk*</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHA2DS2-VASc ≥ 7+</td>
<td>Bridge</td>
<td>Clinical Judgment</td>
</tr>
<tr>
<td>Mod Thrombotic Risk</td>
<td>Clinical Judgment</td>
<td>No Bridge</td>
</tr>
<tr>
<td>CHA2DS2-VASc = 5-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Thrombotic Risk</td>
<td>No Bridge</td>
<td></td>
</tr>
<tr>
<td>CHA2DS2-VASc ≤ 1-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Bleeding risk elevated if major bleed or ICH < 3 months, platelets low or abnormal, aspirin use, supratherapeutic INR, or prior bleeding with bridging or similar surgery

Obstructive Sleep Apnea in Surgical Patients

A 55-y.o. morbidly obese man is scheduled to undergo knee arthroplasty. He has hypertension but no other medical history. He reports occasional fatigue and somnolence. He doesn’t know if he snores or has apneic spells. Exam and recent lab tests were unremarkable.

What should be done?
1. Proceed to OR, but tell surgical team about likely OSA
2. Refer for polysomnography, but don’t delay surgery
3. Delay this elective surgery for polysomnography
OSA and the Surgical Patient

OSA probably increases postoperative complications:
- Pulmonary complications (11 of 17 studies)
- Postop atrial fibrillation (5 of 6 studies)

Previously undiagnosed OSA may be associated with more complications than known OSA

Clinical screening tests have high PPV

Benefits of positive airway pressure (CPAP, BiPAP) for surgical patients with OSA uncertain


Society of Anesthesia and Sleep Medicine Guidelines for Preoperative Evaluation

1. Screen patients clinically for OSA risk
   - Snoring
   - Tired or sleepy
   - Observe apnea
   - Pressure (HTN)
   - BMI > 35 kg/m²
   - Age > 50 years
   - Neck > 17” (M)/16” (F)
   - Gender is male

   STOP-BANG
   - High risk for OSA if either
     - 5 or more total points
     - 2 STOP points + B, N, or G

http://www.stopbang.ca/osa/screening.php

Society of Anesthesia and Sleep Medicine Guidelines for Preoperative Evaluation

2. Insufficient evidence to recommend delaying surgery for advanced testing (polysomnography)
   - Exception: patients with evidence of severe or uncontrolled systemic complications of OSA or impaired gas exchange (e.g., severe pulm HTN, hypoventilation, resting hypoxia)

3. Patient and care team should be informed about known or suspected OSA

4. Continue PAP after surgery

Preventing Postoperative Myocardial Ischemia & Infarction

You perform a preoperative evaluation on your colleague’s patient prior to a femoral-popliteal arterial bypass scheduled for next week. The patient is a smoker and has diabetes and PAD. His only medication is glipizide.

What would you do now:
1. Start aspirin
2. Start metoprolol
3. Start atorvastatin

Strategies to Prevent Postoperative MI

- Stress from surgery
- Clonidine
- Beta-blocker
  - Sympathetic tone
  - Catecholamines
- Increased HR & BP
- Unstable plaque
- Aspirin
- Myocardial ischemia / infarction
- Revascularization
- Statin

Rise & Fall of Beta-blockers

- Early studies showed that perioperative beta-blockers prevented postoperative MI and reduce mortality
- Subsequent studies less impressive, and some positive studies discredited for fraud
- Largest study found small benefit on MI prevention, but increased overall mortality
2014 ACC / AHA Guideline

Only recommendation to use if… (1)
• Already using β-blocker to treat angina, HTN, arrhythmia

Not unreasonable to consider initiation if… (2b)
• High clinical risk (e.g., RCRI score > 3)
• Ischemia seen on preoperative stress test

Avoid initiation… (3)
• On day of surgery


POISE 2 Trial: Aspirin & Clonidine

• POISE 2: Large 2 x 2 RCT comparing perioperative treatment with aspirin, clonidine, both, or neither

• Aspirin did not prevent death or MI, but increased bleeding complications

• Clonidine did not prevent death or MI, but increased clinically significant hypotension & bradycardia

2014 ACC / AHA Guidelines

Aspirin (for patients without stent) & Clonidine

• Initiation of ASA does not benefit patients undergoing elective noncardiac surgery

• Alpha-2 agonists for prevention of cardiac events are not recommended in patients who are undergoing noncardiac surgery

Preoperative Coronary Revascularization

- CARP trial randomized patients with coronary disease to revascularization (PCI or CABG) or medical management alone before major vascular surgery
- Revascularized patients had higher preoperative complications
- No reduction in postoperative mortality or MI

2014 ACC / AHA Guidelines

Preoperative Coronary Revascularization

- Recommended for independent guideline-concordant indications only
- Not recommended exclusively to reduce perioperative cardiac events


Trial of Statins in Vascular Surgery

497 statin naive patients s/f vascular surgery

- Fluvastatin XL 80 mg/day
  - Started > 1 month preop
  - Continued > 1 mo postop
- Placebo

Patients followed for 30 days after surgery
- Endpoint: cardiac death or nonfatal MI

Schouten et al., NEJM, 2009; 361:969-9
Trial of Statins in Vascular Surgery

Schouten et al. NEJM, 2009; 361:980-9

Reduced nonfatal MI

No difference in rates of LFT or CPK elevation

Statins & Noncardiac Surgery

Study Design:
• Observational cohort study of 180,478 VA patients having noncardiac surgery
• 96,486 patients included in propensity-matched cohort
• Measured association between "early treatment" with statin (day of surgery or POD 1) with postoperative mortality and complications

London et al. JAMA Intern Med. doi:10.1001/jamainternmed.2016.8005 Published online

Statins & Noncardiac Surgery

Early statin use (POD 0 or 1) associated with:
• Lower all-cause 30-day mortality [RR 0.82; NNT 224]
• Fewer cardiac complications [RR 0.73; NNT 335]
• Reduced total complications [RR 0.82; NNT 67]
(Respiratory, infection, renal but not stroke, thrombosis)

Dose effect detected:
• Moderate-high intensity dose associated with better outcomes than low intensity dose

Caveat:
• Retrospective, potential for confounders

2014 ACC / AHA Guideline (Statins)

Definitely continue if… (Class I)
  • Patient is already taking statins chronically

Reasonable to initiate if… (Class 2a)
  • Patient is having vascular surgery

Not unreasonable to initiate if… (Class 2b)
  • Patient has elevated clinical risk and is undergoing a moderate or high risk operation


Chronic Opiate Use after Surgery

Background:
  • Growing concern about overuse of opiates, especially for chronic, non-cancer pain
  • Less concern about opiate use for acute pain
  • Little attention to opiate use to treat postoperative pain
  • ~ 50 million inpatient operations per year and similar number of ambulatory surgeries (large risk pool)

Question: What is the risk of new persistent opiate use after surgery?

Study design:
  • 36,177 surgical patients having one of 13 common operations (80% minor surgery, no ortho/spine cases)
  • Only studied opiate naïve patients (no opiate rx for 12 months prior to perioperative period)
  • Determine incidence and risk factors for persistent opiate use more than 90 days after surgery

Published online April 12, 2017
Chronic Opiate Use after Surgery

Findings:
Overall 6% incidence of new persistent opiate use
– Similar for major & minor surgery
Risk factors for developing chronic use:
– Alcohol, tobacco, drug use
– Higher baseline comorbidity
– Anxiety & mood disorder
– Other pain (back, neck, arthritis)

Conclusions
• If DAPT must be stopped, delay elective surgery for 6 mo after DES implantation (3 months if surgery is time-sensitive)
• Bridging anticoagulation not indicated for most patients with atrial fibrillation (and probably mechanical valves)
• Screen patients for OSA, but not necessary to delay surgery
• Consider starting statin in patients with increased cardiac risk before surgery
• Prescribe opiates after surgery with caution, especially in presence of substance abuse and chronic pain

Thank You

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