Pre-Operative Services Teaching Rounds 3
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Deborah Richman MBChB FFA(SA)
Director – Pre-Operative Services
Department of Anesthesia
Stony Brook University Medical Center, NY
drichman@notes.cc.sunysb.edu
• **Coronary Artery Disease (CAD/IHD)**
  ○ Pathophysiology
  ○ History
  ○ Physical
  ○ Labs
  ○ Preoperative work up using AHA guidelines
  ○ Medications

• **Breast surgery**
  ○ anesthesia
  ○ positioning
Case: 57 yr old male for left total mastectomy/ALND for breast cancer

- **HPI** – bloody discharge from nipple
- **PMH** –
  - CAD: MI age 44 treated with 1 stent
    - Current symptoms – chest pressure on exertion, monthly, relieved by rest.
  - Hypertension
  - DM for 15 years
  - Effort tolerance – 4 METs
- **PSH** –
  - Lap chole 15 years ago
  - Elbow surgery 18 years ago
Case (cont)

- Current smoker
- Meds:
  - Aspirin
  - Metformin
  - Sitagliptin (Januvia)
  - Glipizide
  - Nifedipine
  - Metoprolol
  - Isosorbide mononitrate
  - Rosuvastatin
Case (cont)

- **Exam:**
  - BMI 29
  - BP 120/70 HR 72
  - No signs of heart failure
- **ECG:** SR 70, inferior Q’s, poor R wave progression
- Followed by PMD only for 10 years.
CAD Pathophysiology

- Starts in adolescence
- Fatty streak (containing atherogenic lipoproteins, macrophage foam cells, Ca\(^{2+}\)) between endothelium and internal elastic lamina
- Attempted healing — fibrous layer with lipid core/smooth muscle and connective tissue
- Plaque rupture leads to exposure of thrombogenic scar/necrotic material: platelet aggregation and clot.
Pathophysiology (cont)

- Leading cause of death worldwide
- Accumulation of atheromatous plaques in blood vessels supplying the heart
- Slow occlusion – development of collaterals
- Plaque rupture – acute event
- Ischemia – limitation of blood flow
- Infarction – no flow with myocyte death
- Scarring and remodelling
Risk factors

- Male
- Cigarette smoking
- High cholesterol
- Hypertension
- Diabetes
- Obesity
- Sedentary lifestyle
- Family history
To ask on History:

- Myocardial infarct
- Heart failure
- Peripheral vascular disease
- Cerebrovascular disease
- Arrhythmias
Specifically on History

Current symptoms

- Chest pain or pressure
  - Jaw / arm/face/ neck discomfort
  - Indigestion
  - Nausea
  - What brings it on?
  - What relieves it?

- Dyspnoea on exertion
  - Sudden shortness of breath – acute pulmonary edema is a sign of ischemia

- Syncope or dizzyness
- Palpitations
- Fatigue
Physical

- General
- HR and BP
- (Xanthomata)
- (Signs of cardiac failure.)
- CAD has no specific findings
Labs

- ECG?
  - Low risk procedure, stable patient,
  - AHA: Class 3 evidence (could be harmful)

Class I: evidence and/or general agreement that a given procedure/therapy is useful and effective.

Class II: conflicting evidence and/or a divergence of opinion about the usefulness/efficacy
  - Class IIa: Weight of evidence/opinion is in favor of usefulness/efficacy.
  - Class IIb: Usefulness/efficacy is less well established by evidence/opinion.

Class III: evidence and/or general agreement that a procedure/therapy is not useful/effective and in some cases may be harmful.
### "Size of Treatment Effect"

<table>
<thead>
<tr>
<th>Class</th>
<th>Benefit &gt;&gt; Risk</th>
<th>Benefit &gt;&gt; Risk</th>
<th>Benefit ≥ Risk</th>
<th>Benefit ≥ Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>Benefit &gt;&gt; Risk</td>
<td>Additional studies with focused objectives needed</td>
<td>Additional studies with broad objectives needed; Additional registry data would be helpful</td>
<td>Procedure/Treatment SHOULD be performed/administered</td>
</tr>
<tr>
<td>Class IIa</td>
<td>Benefit &gt;&gt; Risk</td>
<td>Additional studies with focused objectives needed</td>
<td>Procedure/Treatment MAY BE CONSIDERED</td>
<td></td>
</tr>
<tr>
<td>Class IIb</td>
<td>Benefit &gt;&gt; Risk</td>
<td>Additional studies with broad objectives needed; Additional registry data would be helpful</td>
<td>Procedure/Treatment MAY BE CONSIDERED</td>
<td></td>
</tr>
<tr>
<td>Class III</td>
<td>Benefit ≥ Risk</td>
<td>Additional studies with broad objectives needed; Additional registry data would be helpful</td>
<td>Procedure/Treatment MUST BE PERFORMED/ADMINISTERED</td>
<td></td>
</tr>
</tbody>
</table>

#### Level A
- Multiple (3-5) population risk strain evaluated
- General consistency of direction and magnitude of effect

- Recommendation that procedure or treatment is useful/effective
- Sufficient evidence from multiple randomized trials or meta-analyses

- Recommendation in favor of treatment or procedure being useful/effective
- Some conflicting evidence from multiple randomized trials or meta-analyses

- Recommendation’s usefulness/effectiveness less well established
- Greater conflicting evidence from multiple randomized trials or meta-analyses

#### Level B
- Limited (2-3) population risk strain evaluated

- Recommendation that procedure or treatment is useful/effective
- Limited evidence from single randomized trial or non-randomized studies

- Recommendation in favor of treatment or procedure being useful/effective
- Some conflicting evidence from single randomized trial or non-randomized studies

- Recommendation’s usefulness/effectiveness less well established
- Greater conflicting evidence from single randomized trial or non-randomized studies

- Recommendation that procedure or treatment not useful/effective and may be harmful
- Limited evidence from single randomized trial or non-randomized studies

#### Level C
- Very limited (1-3) population risk strain evaluated

- Recommendation that procedure or treatment is useful/effective
- Only expert opinion, case studies, or standard-of-care

- Recommendation in favor of treatment or procedure being useful/effective
- Only diverging expert opinion, case studies, or standard-of-care

- Recommendation’s usefulness/effectiveness less well established
- Only diverging expert opinion, case studies, or standard-of-care

- Recommendation that procedure or treatment not useful/effective and may be harmful
- Only expert opinion, case studies, or standard-of-care

#### Suggested phrases for writing recommendations

- Is recommended
- Is indicated
- Is probably recommended or indicated
- May/might be considered
- May/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established
- Is not recommended
- Is not indicated
- Should not
- Is not useful/effective/beneficial
- May/might be harmful

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*Data available from clinical trials or registries about the usefulness/effectiveness in different sub-populations, such as gender, age, history of diabetes, history of prior MI, history of heart failure, and prior aspirin use. A recommendation with Level of Evidence B or C does not imply that the recommendation is weak. Many important clinical questions addressed in the guidelines do not lend themselves to clinical trials. Even though randomized trials are not available, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

In 2003, the ACC/AHA Task Force on Practice Guidelines developed a list of suggested phrases to use when writing recommendations. All recommendations in this guideline have been written in full sentences that express a complete thought, such that a recommendation, even if separated and presented apart from the rest of the document (including headings above sets of recommendations), would still convey the full intent of the recommendation. It is hoped that this will increase readers' comprehension of the guidelines and will allow queries at the individual recommendation level.
Labs (cont)

- CBC?
  - History of blood loss/new or increasing DOE or palpitations
- Chem?
  - No (for diabetes – likely yes.)
- Other?
Is he optimized?

- Proceed with surgery?
- See cardiologist?
- What should cardiologist do?
AHA:
‘Of the cardiology consultations, 40% contained no recommendations other than "proceed with case," "cleared for surgery," or "continue current medications."’

1
Risk factor management

- Weight loss
- Smoking
- Exercise
- Cholesterol management
- BP control
- Diabetes control
Medical Management
  • Beta blocker
  • Nitroglycerin
  • Calcium channel blocker
  • Aspirin
  • Statin

Revascularization
  • CABG
  • PCI +/- stent
Cardiac evaluation and care algorithm for noncardiac surgery based on active clinical conditions, known cardiovascular disease, or cardiac risk factors for patients 50 years of age or greater

Step 1: Need for emergency noncardiac surgery?
- Yes (Class I, LOE C)
  - Operating room
  - Perioperative surveillance and postoperative risk stratification and risk factor management
- No

Step 2: Active cardiac conditions*
- Yes (Class I, LOE B)
  - Evaluate and treat per ACC/AHA guidelines
  - Consider operating room
- No

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

Step 4: Good functional capacity (MET level greater than or equal to 4) without symptoms†
- Yes (Class I, LOE B)
  - Proceed with planned surgery
- No or unknown

Step 5: Vascular surgery
- Class IIa, LOE B
  - Consider testing if it will change management§

Intermediate risk surgery
- Vascular surgery
- Intermediate risk surgery

1 or 2 clinical risk factors‡
- Proceed with planned surgery with HR control§ (Class IIa, LOE B)
- or consider noninvasive testing (Class IIb, LOE B) if it will change management

No clinical risk factors‡
- Class I, LOE B
  - Proceed with planned surgery

*Active Cardiac Conditions for Which the Patient Should Undergo Evaluation and Treatment Before Noncardiac Surgery (Class I, Level of Evidence: B)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Examples</th>
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</table>
| • Unstable coronary syndromes | • Unstable or severe angina* (CCS class III or IV) †  
| | • Recent MI ≠  
| | • (NYHA functional class IV; worsening or new-onset HF) |
| • Decompensated HF | |
| • Significant arrhythmias | • High-grade atrioventricular block  
| | • Mobitz II atrioventricular block  
| | • Third-degree atrioventricular heart block  
| | • Symptomatic ventricular arrhythmias  
| | • Supraventricular arrhythmias (including atrial fibrillation) with uncontrolled ventricular rate (HR greater than 100 beats per minute at rest)  
| | • Symptomatic bradycardia  
| | • Newly recognized ventricular tachycardia |
| • Severe valvular disease (progressive dyspnea on exertion, exertional presyncope, or HF) | • Severe aortic stenosis (mean pressure gradient greater than 40 mm Hg, aortic valve area less than 1.0 cm², or symptomatic)  
| | • Symptomatic mitral stenosis |

*According to Campeau.⁹  
†May include "stable" angina in patients who are unusually sedentary.  
±The American College of Cardiology National Database Library defines recent MI as more than 7 days but less than or equal to 1 month (within 30 days).

•CCS indicates Canadian Cardiovascular Society.
Canadian angina classification

- **Classification**
- Class 0: Asymptomatic
- Class 1: Angina with strenuous Exercise
- Class 2: Angina with moderate exertion
- Class 3: Angina with mild exertion
  - Walking 1-2 level blocks at normal pace
  - Climbing 1 flight of stairs at normal pace
- Class 4: Angina at any level of physical exertion
Surgical procedure

- **High risk** (>5% cardiac risk)
  - Emergent major especially elderly
  - Aortic and major vascular
  - Peripheral vascular
  - Prolonged with large fluid shifts/blood loss

- **Intermediate** (<5%)
  - Carotid
  - Head & neck
  - Intraperitoneal and intrathoracic
  - Orthopedic
  - Prostate

- **Low** (<1%)
  - Endoscopic surgery
  - Breast
  - Superficial
  - Cataract
Functional capacity

METS (metabolic equivalents)

1 MET is defined as 3.5 ml O2 uptake/kg per min, which is the resting oxygen uptake in a sitting position.

1 - 4: walking around the house to dishwashing
4 – 10: climbing stairs to playing golf
>10: swimming/skiing/singles tennis

Good functional capacity >/= 4 METs
2 blocks on the flat at normal pace
1 flight of stairs / or up a hill.
‡Clinical risk factors include:

- history of heart disease,
- history of compensated or prior heart failure,
- history of cerebrovascular disease,
- diabetes mellitus, and
- renal insufficiency.
Why no testing?

CARP trial
510 patients for major vascular surgery
- Cardiac cath
- randomized to:
  - coronary artery revascularization (n=258)
    before vascular surgery
  - no coronary intervention before vascular surgery (n=252).

McFalls et al. NEJM 351 (27): 2795, 2004
**Conclusions**: Coronary-artery revascularization before elective vascular surgery does not significantly alter the long-term outcome. Cannot be recommended in patients with stable cardiac symptoms for vasc surgery.
• Reanalysis of the CARP results type of revascularization—CABG or percutaneous coronary intervention (PCI)—CABG was better


• Further analysis of CARP patients: one subgroup—patients with left main disease—did experience an improved survival with pre-operative coronary revascularization.

  Garcia S. Am J Cardiol 2008; 102:809–813.
Breast surgery

- Low risk
  - for cardiovascular /respiratory complications
- Supine
- Local anesthesia
- GA for mastectomy and/or ALND
- Role of epidural and intrapleural blocks in cancer management.
Summary: Focused H&P for low risk surgery.

- Known CAD – MI etc.
- Symptoms (looking for active cardiac conditions)
- Stable?
- Appropriate medical management
  - Continue peri-operatively
  - Review of risk factors: (FH) (Cholesterol)
    - Smoking
- Cardiologist’s name and no
  - (Last stress – no)   (Last ECHO – no)
To be continued..... Next week
References