General Surgery I: Preoperative Examination and Surgical Management

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Disclosure Statement

Dr. Vail has nothing to disclose.

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Learning Objectives

1. Screen patients for risk factors before they undergo surgical procedures and report subsequent risks to the patient’s surgical care team.
2. Evaluate patients for preoperative cardiac risk based on the risk and complexity of the surgery and the functional status of the patient.
3. Understand the perioperative management of diabetes.
Preoperative Evaluation Goal

• To identify and manage medical conditions that may impact perioperative morbidity and mortality
• Accurate communication to the patient and the surgical team
• Medical optimization (rather than “clearance”)
Preoperative Evaluation

• Thorough medical history
• Assessment of perioperative risk factors
• Physical exam
  – BMI, BP, O₂ sat, cardiac, pulmonary
• Ancillary tests
• Interventions recommended to mitigate risks
• Social support
  – Care giver, home health, rehab?
Issues Pertinent to Surgery

- Current medical problems
- Cardiac status
- Pulmonary status
- Functional status ($\geq 4$ METs)
- Hemostasis status (Hx of abnormal bleeding)
- Possibility for symptomatic anemia
- Possibility of pregnancy
- History of anesthesia problems
- Smoking
Preoperative Evaluation

1. Assess the risk/complexity of the surgery
2. Assess the functional status of the patient
3. Decide on cardiac evaluation
4. Consider other testing
1. A 72 y/o patient of yours with diabetes and hypertension is having cataract surgery and she comes to you for a pre-op evaluation. What will you order?

A. ECG  
B. CBC  
C. BUN/creatinine and electrolytes  
D. Thallium stress test  
E. Nothing
1. A 72 y/o patient of yours with diabetes and hypertension is having cataract surgery and she comes to you for a pre-op evaluation. What will you order?

A. ECG  12%
B. CBC  1%
C. BUN/creatinine and electrolytes  10%
D. Thallium stress test  0%
E. Nothing  76%
Evaluating for Risk of Perioperative MI

• Highest risk procedures (> 5% risk of MI)
  – Aortic and peripheral vascular surgery*
  – Emergent major operations (especially if patient > 75 years of age)
• Intermediate risk (1-5% risk)
  – Head and neck surgery (carotid endarterectomy)
  – Intraperitoneal or intrathoracic surgery
  – Orthopedic
  – Prostate
• Low risk (< 1% risk)*
  – Endoscopic procedures
  – Cataract surgery*
  – Breast surgery
2. You have an 87 y/o patient who stays active in his steeply sloped yard (raking, mowing, planting). What could be said about his functional capacity.

A. His METS are less than 4.
B. He would require an ECG prior to a laparoscopic hernia repair.
C. His METS are greater than 4.
D. He would not qualify for hernia surgery
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A. His METS are less than 4.
B. He would require an ECG prior to a laparoscopic hernia repair.
C. His METS are greater than 4. **(Correct Answer)**
D. He would not qualify for hernia surgery
Functional Status of the Patient

- **Poor functional status**
  - < 4 METS (metabolic equivalents—assessment of energy expenditure)
    - Can do light housework (dusting, dishwashing)
    - Can walk a block or two on level ground
    - Cannot climb a flight of stairs, walk up a hill, or run
  - Should have noninvasive testing for moderate or high-risk surgery
    - ECG and exercise or pharmacologic stress testing
Functional Status

• Examples of activities requiring > 4 METS and indicating *good functional status*:
  – Golf
  – Bowling
  – Dancing
  – Doubles tennis
  – Heavy work around the house

• *Good functional status*—non-invasive testing only for high-risk surgeries
Cardiac Evaluation: ECG

1. Indicated for high-risk patients:
   - Active cerebro/cardiovascular signs or symptoms (CVA/TIA, CHF, ischemic cardiac disease)
   - Renal insufficiency (Cr > 2.0 mg/dL)
   - Diabetes requiring insulin
2. Indicated for high-risk procedure
3. Indicated for intermediate-risk procedure if patient has poor functional capacity
4. Not indicated for intermediate-risk procedures* if patient has good functional capacity
5. Not indicated for low-risk procedures
Cardiac Evaluation

• Noninvasive testing first* - any of the following:
  – ECG
  – Thallium stress test
  – Exercise testing if patient is capable

• Invasive testing for positive results
  – Cardiac catheterization
3. Which of the following is true regarding coagulant management of a 65 y/o with hypertension and hyperlipidemia prior to a right colectomy?

A. Order an INR and platelets  
B. Stop his baby aspirin a week prior to surgery  
C. Order a bleeding time  
D. Obtain a bleeding history and continue aspirin
3. Which of the following is true regarding coagulant management of a 65 y/o with hypertension and hyperlipidemia prior to a right colectomy?

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D. Obtain a bleeding history and continue aspirin
Aspirin

- Safe to continue low-dose aspirin, as it reduces CV complications
- Increases bleeding risk by 20%
- Continue if history of MI or coronary stents
  - Discontinuation results in a 3-fold increase in the risk of adverse cardiac events
  - Cessation results in a 90-fold increase in complications in patients with coronary stents
- No difference in severity of bleeding events (except intracranial and maybe prostatectomy)
- Discuss with surgeon
Beta-Blockers

• Continue beta-blockers before, during, and after surgery
  – If they have been used for at least 4 weeks prior to surgery (SOR: A)
  – Used for known ischemic HD undergoing vascular surgery
  – Reduce cardiac oxygen demand
  – Reduce risk of nonfatal MI and cardiac death

• If beta-blockers have not been used for at least 1 week, initiation may be harmful (SOR: B)
Revised Cardiac Risk Index (RCRI) or Goldman Classification

• 1 point each for:
  – History of CVA/TIA
  – CHF
  – Renal insufficiency (Cr > 2.0 mg/dL)
  – Diabetes requiring insulin
  – Ischemic cardiac disease
  – Suprainguinal vascular, intrathoracic, intra-abdominal surgical site

• RCRI = 0  NNT with beta-blocker = 2349, NNH = 208
• RCRI ≥ 4  NNT with beta-blocker = 33
• Use beta-blockers only if RCRI is ≥ 2
Statins

• Statin benefits
  – Lipid-lowering
  – Reduce vascular inflammation
  – Improve endothelial function
  – Stabilize atherosclerotic plaques (reduce 30-d MI & death)

• Statin therapy (lovastatin and fluvastatin longer acting)
  – Even beneficial within days of procedure
  – Ideally started several weeks prior to surgery
  – Without regard to lipid levels
  – Decreases significantly the CV risk for vascular surgery
  – Risk of CV events sharply increases if stopped
Coronary Artery Revascularization Prophylaxis

- Accomplished by PCI or CABG
- CARP Trial (follow up 2.7 years)
  - No difference in all-cause mortality
  - No difference in incidence of postoperative MI
- DECREASE-V
  - Preoperative revascularization—no benefit
- Surgery during the dual antiplatelet therapy period substantially increases risk
  - Clopidogrel (Plavix) and aspirin
  - Bare – 6 wk; Drug-eluting – 12 mo
4. Which of the following procedures is an indication for a pre-operative chest x-ray?

A. Hernia repair
B. Emergency surgery for a ruptured diverticuli
C. Cataract surgery
D. Patient > age 50
4. Which of the following procedures is an indication for a pre-operative chest x-ray?

A. Hernia repair
B. Emergency surgery for a ruptured diverticuli
C. Cataract surgery
D. Patient > age 50

- A: 9%
- B: 56%
- C: 0%
- D: 35%
Chest X-ray

• No outcomes evidence for routine CXR
• Indications for CXR
  – New or unstable cardiopulmonary signs or symptoms
• Risk factors for pulmonary complications:
  – COPD
  – Age > 60 years
  – Functional dependence
  – Hypoalbuminemia
  – CHF
  – Emergency or prolonged procedure
  – Certain surgical sites (head, neck, upper abdomen)
Routine Laboratory Tests

- *Urinalysis*: only for implantation of foreign material (hip replacement, heart valve) or urologic procedures

- *Electrolyte and creatinine* testing:
  - PMH of HTN, CHF, CKD, complicated DM, liver disease
  - Medications: diuretics, ACE-I/ARB, NSAIDs, digoxin

- *A1c*: indicated only for patients at very high risk or signs and symptoms of undiagnosed diabetes

- *CBC*: at risk for anemia (chronic kidney or liver disease, or inflammatory diseases) or excessive blood loss

- *Coagulation tests*: based on bleeding history or if taking anticoagulants.
Laboratory Testing

• Pregnancy testing in patients of child-bearing age
  – Sexually active and delayed menses
  – Concerned about pregnancy
  – Possibility of pregnancy is uncertain

• > $30 billion annually on preop exams
  – 60% are unnecessary
  – 30-95% of unexpected lab abnormalities not addressed
5. Your 57 y/o patient has rheumatoid arthritis and is having a hip replacement surgery. Which x-ray should you order?

A. The contralateral hip
B. Chest x-ray
C. Cervical spine film
D. KUB
E. Bone density
5. Your 57 y/o patient has rheumatoid arthritis and is having a hip replacement surgery. Which x-ray should you order?

A. The contralateral hip  
B. Chest x-ray  
C. Cervical spine film  
D. KUB  
E. Bone density

15%  
29%  
34%  
2%  
20%

Correct answer: C. Cervical spine film
Rheumatoid Arthritis

• Patients with rheumatoid arthritis require C-spine imaging for atlantoaxial subluxation prior to intubations*
  – Prevent spinal cord injury during intubation
  – May require cervical fusion prior to surgery
Perioperative Management
Medication Management

• Medications to stop:
  – Clopidogrel/ticlopidine: 5-7 days prior
  – NSAIDs: 1-3 days prior
  – COX-2 agents: 2-3 days prior
  – Dabigatran (Pradaxa): 2-5 days prior
  – Rivaroxaban (Xarelto): at least 24 hours

• Medications to give:
  – Parenteral antibiotics: 30 min prior
  – Long-acting insulins: Morning of surgery
  – Steroids: usual daily dose
Warfarin Management

• Low thromboembolic risk
  – A-fib with no CVA or embolism in past 12 months
  – Biological heart valves > 3 months out
  – Vascular grafts
  – DVT > 3 months out—no hypercoagulable
  – No current systemic arterial embolism

• Management
  – Stop 5 days pre-op
  – Restart post-op when taking PO
Warfarin Management

• High thromboembolic risk
  – Mechanical heart valve
  – DVT/PE with hypercoagulable state
  – History of DVT/PE < 3 months ago

• Management
  – Stop 4 days pre-op and start LMWH
  – Stop LMWH 12-18 hours pre-op
  – Restart LMWH 6 hours post-op
  – Restart warfarin when taking PO
  – Stop LMWH when INR = 2.0
Herbal Medications

• 70% of patients fail to disclose use of herbal medicines
• 8 most commonly used
  – Echinacea, ephedra, garlic, ginkgo, ginseng, kava, St. John’s wort, valerian
• Alteration of the actions of absorption, distribution, metabolism, and elimination of conventional drugs
Surgery and Coronary Stents

- **Bare stents**
  - Surgery should be avoided for at least 4 wks
- **Drug-eluting**
  - Surgery should be avoided for 1 yr
- **If surgery is unavoidable**
  - Dual anti-platelet Rx (clopidogrel and aspirin) should be continued perioperatively unless strongly contraindicated. Procedures associated with high risk for clinically significant bleeding (intracranial or prostatic surgery)
Perioperative Issues

• Majority of perioperative problems:
  – Cardiac
  – Pulmonary
  – Renal
  – Infectious
  – Hematologic
Assess for Risks of Delayed Healing and Infection

- Risks for surgical-site infection
  - Smoking
  - Diabetes
  - Obesity
  - Malnutrition
  - Chronic skin disease
Perioperative Management

• Diabetes:
  – Increased risk of infection
  – Increased post-op cardiovascular morbidity and mortality
  – Poor preoperative control leads to poor outcomes, so control should be addressed prior to surgery
  – Continue usual diabetes regimen* and minimize fasting
Instructions

• STOP SMOKING
  – It’s so important it gets its own slide
  – Some surgeons will not do elective surgery if the patient smokes
Instructions: Fasting

• 2-4-6-8 hour rule
  – 2 hours for “clear liquids” (water, pulp-free fruit juice, carbonated beverages, clear tea, and coffee)
  – 4 hours of breast milk
  – 6 hours for non-human milk and light meals such as toast
  – 8 hours for regular meals; fried, fatty foods; meat
6. Which of the following is the most important risk factor for postoperative pulmonary complications?

A. COPD
B. General anesthesia
C. Peripheral vascular procedure
D. Diabetes
E. Obesity
6. Which of the following is the most important risk factor for postoperative pulmonary complications?

- A. COPD (56%)
- B. General anesthesia (18%)
- C. Peripheral vascular procedure (5%)
- D. Diabetes (2%)
- E. Obesity (19%)
Postoperative Complications

• Risk factors for pulmonary complications
  – Advanced age
  – Functional dependence
  – COPD
  – Heart failure
  – Serum albumin < 30 g/L
  – High-risk surgery (vascular, emergent, AAA, prolonged, neurosurgery, abdominal)
Pulmonary Complications

• Common pulmonary complications
  – Atelectasis
  – Pneumonia
  – Respiratory failure
  – Bronchospasm
  – Exacerbation of underlying disease

• Prevention
  – Incentive spirometer
  – Chest physiotherapy
  – Preoperative corticosteroids for COPD, etc
Pulmonary Risks

• Procedure-related risk factors are more predictive of pulmonary complications than patient-related factors
  – Greatest risk is how close surgery is to the diaphragm (thoracic)
  – Surgery > 3 hours significantly increases risk
  – Pre-op $O_2$ sat $\leq 91$

• Need to quit smoking 8 weeks prior to surgery
Obstructive Sleep Apnea

• All patients should be screened for OSA (SOR C)
• Patients with OSA who have an oral appliance or CPAP equipment should bring these with them on the day of the surgery (SOR A)
  – Should be in pre-op recommendations
Renal Status

- Patients with CRF are at increased risk
  - Surgery well tolerated if GFR > 25 mL/min
  - GFR 10-15 mL/min – complications rise 55-60%
  - Consider preoperative dialysis
- Postoperative acute kidney injury (AKI) has a 58% mortality rate (develops in 1% of surgical patients)
Minimizing Perioperative Risk

- Ensure preoperative euvolemia and normal osmolar status
- Minimize exposure to nephrotoxins
- Avoid perioperative hypotension
- Consider preoperative dialysis if GFR < 15 mL/min
Infection

- Pneumonia is most prominent remote infection
  - Prevent with early ambulation, incentive spirometry, tight glycemic control
- Surgical site infections = 37% of post-op infections
  - Prevent with tight glucose control
  - Treat preexisting infections
  - Provide nutritional supplementation 7-14 days preoperatively
  - Smoking cessation
Preventing MRSA

- 8% of nosocomial infections
- Universal frequent hand washing and room cleaning
- Use of good isolation techniques
Thromboembolism Prophylaxis

- Low risk: early mobilization
- Medium risk: intermittent pneumatic device or graduated compression stockings, low molecular weight heparin (LMWH) -- or fondaparinux [Arixtra] or warfarin
- High risk: LMWH (or as above), graduated compression stockings and intermittent pneumatic device
Pediatrics

• Consider delaying surgery in a pediatric patient with a URI if using general anesthesia and 1 or more of the following are present
  – Asthma
  – History of prematurity
  – Copious secretions
  – A parent who smokes
  – Planned use of an endotracheal tube
  – Procedure involving the airway
Joint Management

Consider agreement with surgeon to order standard tests depending on the surgery to be performed

– Eg, ultrasound for cholecystectomy
Local Anesthesia

• Decrease pain from infiltration of local anesthetics:
  – Warm solution
  – Small needles
  – Slow infiltration
  – Sodium bicarbonate
  – Inject through edge of wound
  – Pretreat with topical anesthetics.
References


Answers

1. E
2. C
3. D
4. B
5. C
6. A