Perioperative Assessment of Medical Comorbidities

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Successful outcome
- Proper selection of patients for a particular procedure
- Preoperative assessment
- Risk factors and comorbidities
- Surgical skills and judgement
- Anesthesia
- Postoperative care
Today’s challenges

- Increasing obesity
- Increasing lifespan with higher rate of medical comorbidities

Fluid Balance

- Women have a higher % of body fat with a corresponding decrease in TBW (which corresponds to 45-60% of total body weight)
- Aging decreases intracellular H2O, minerals, proteins, and increases extracellular H2O and fat
- Intra- and postoperative events (blood loss, insensible loss from respiration and peritoneum, vomiting and diarrhea, fever and vasodilatory effects of anesthetics) may have a significant effect on fluid balance

Preoperative hydration

- Dehydration
- Vomiting
- Fever
- Mechanical bowel prep
- Uterine bleeding
- Bowel obstruction
Electrolyte Abnormalities

Sodium

- Acute postoperative hyponatremic syndrome has been described in female patients after elective surgery with minimal blood loss
- Headache, lethargy, altered mental status
- Most common causes: periop use of diuretics, prolonged hysteroscopy, chronic renal insufficiency, inappropriate secretion of ADH

Treatment

- Hypertonic saline, restriction of free H2O
- Sudden hypernatremia: altered mental status, seizures, coma, intracranial hemorrhage; correction: SLOW, no more than 10 mEq/d
- Consider IM, nephrology consult

Potassium

- Acute hyperkalemia most commonly is a result of renal insufficiency or failure, or after sudden reperfusion of ischemic tissue
- Fatal cardiac arrhythmias
- Initial treatment: IVF with NS, furosemide, oral or rectal potassium-binding resins (polystyrene sulfonate)
- Later: IV Ca or bicarbonate, glucose and insulin, hemodialysis
Hypokalemia
- Fatigue, muscle weakness, ileus
- Causes: renal or GI losses
- Tx: oral or IV replacement
- Can be exacerbated by hypomagnesemia

Calcium and Magnesium
- Ca: coagulation cascade, regulation of neuronal, myocardial, renal function
- HypoCa: in severe pancreatitis, tumor lysis syndrome, after parathyroidectomy
- Symptoms: paresthesias, muscle cramps, tetany seizures, cardiac arrhythmias
- Tx: slow replacement

Hypercalcemia
- Weakness and obtundation
- Cancer patients: from bony mts, by release of PTH-related peptides from the tumor
- Medical management: IVF, loop diuretics, bisphosphonates, calcitonin

Hypermagnesemia
- Usually associated with renal failure
- Respiratory distress, heart failure
Hypomagnesemia
- Chronic diarrhea, renal insufficiency, use of diuretics
- Severe cases are associated with hypocalcemia

Screening
- Identify patients at increased risk for surgical complications
- Detailed H&P, review of medical records
- Assess patient’s general health and level of physical activity
- Allergies
- Medications
- PMH, current medical problems
- PSH, outcomes, complications
- FH (VTE, bleeding, malignant hyperthermia, anesthetic complications)
- SH
- ROS

Cardiovascular Diseases
- 460,000 women in 2004
- 30 million people undergo surgical procedures
- 1:30 perioperative cardiac complications
- 50% of women referred for angiography for chest pain will show little to no coronary obstruction whereas only 17% of men with the same symptoms will have negative testing
- High cholesterol levels are not as predictive of cardiovascular disease risk in women as are high TG levels when compared with men
Guidelines changed.. again

- Minor clinical predictors of cardiac risks: advanced age, abn ECG, uncontrolled HTN alone do not affect perioperative risk

- The active cardiac conditions (aka major clinical predictors): unstable coronary syndromes (acute or recent MI, unstable angina, decompensated heart failure, severe valvular disease, and significant arrhythmias

- Patients undergoing low risk surgical procedures (endoscopic, breast, ambulatory) who don’t have an active cardiac conditions can proceed to surgery without further workup

- Patients with clinical risk factors undergoing intermediate- to high-risk surgeries should be assessed according to their symptoms and functional capacity

- The best way to evaluate patient’s functional capacity is to check on her ability to perform 4 metabolic equivalent tasks (METs) of work
If a patient is able to perform 4 METs of work, in general, surgery may be performed without further workout.

Patients for high-risk surgeries with potential large loss of blood, possible massive fluid shifts, should undergo cardiac workout even with intermediate clinical risks.

A number of indices have been developed to identify risk factors of increased perioperative cardiac morbidity.

6 Risk Factors increasing the risk of perioperative mortality

- Hx of ischemic heart disease
- High risk surgery
- CHF
- CVD
- Current treatment with insulin
- Preoperative Cr greater than 2 mg/dl

These risk factors were used in a prospective study that included more than 4,000 patients 50 y.o or older undergoing noncardiac surgery with goal to identify risks of major cardiac complications (MCCs).

Patients with no risk factors had a 0.5% risk of MCCs, patients with 1, 2, 3 or more risk factors had a 1.3%, 4%, and 9% risk of MCCs respectively.

The guidelines from the American Heart Association and American College of Cardiology (AHA/ACC) help to identify patients for preoperative testing in case of future intermediate risk surgery.
Hematologic Conditions

Many environmental, inherited, and acquired risk factors change coagulability

Surgery is a known precipitating factor of potential venous thromboembolic event

Preoperative assessment helps to determine patient’s level of DVT prophylaxis

- **Bleeding disorders**: inherited or acquired
- ACOG: “Hysterectomy for excessive bleeding should not be performed without the consideration of bleeding disorders”

- A screening history in this case should include questions about frequent nosebleeds, gum bleeding, easy bruising, bleeding after dental extraction, bleeding following surgery, body piercing, menstrual bleeding history, use of medications like warfarin, aspirin, NSAIDS
Pulmonary Diseases

- Patient factors: age, chronic lung disease, tobacco use-the risk is highest in those patients who have smoked in the past 2 months prior to surgery (if they stop for more than 6 months before surgery, they do not have an increased risk of pulmonary complications after surgery), obesity, CHF, impaired sensorium, obstructive sleep apnea

- Procedure related factors: choice of anesthesia, duration of surgery, type of the abdominal incision
• OSA - 25% adults increases the risk for airway management, but its role in postop pulmonary complications has not been studied extensively

• Preoperative Tx of OSA with bivave positive airway pressure or continuous positive airway pressure improves heart function, reduces pulmonary artery pressure, and normalizes blood pressure

• Patients who smoke and patients with diabetes are almost 3 times more likely to have OSA than the general population

• Patients with ? OSA should be referred to a pulmonologist or sleep medicine specialist for further evaluation and treatment

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**Endocrine Diseases**

• Stress response to surgery includes the release of epinephrine, norepinephrine, cortisol with significant effect on cv, renal systems, metabolism in general

• DM: 15-20% of patients undergoing surgery

• Higher cv risk for women than men

• Higher risk of metabolic, infectious, renal complications

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• Hyperglycemia impairs wound healing by reducing the function of phagocytes and granulocytes, and collagen synthesis is affected by blood glucose greater than 200 mg/dl.

  Oxygen delivery to tissues is decreased

  Multiple studies showed less wound infections when patient had tighter glycemic control

  Women with longer than 10 years treatment for DM are at higher risk for diabetic complications such as neuropathy or/and nephropathy compare to women treated for less than 10 years
Thyroid Disease

- **Hypothyroidism** affects multiple organ systems
- Preoperatively patients with chronic fatigue, new-onset depression should be screened for hypothyroidism
- Dry skin, coarse hair, delayed reflexes, bradycardia, goiter
- The most serious perioperative complications are cardiovascular collapse and postoperative myxedema, with rare evidence of myxedematous coma: unexplained seizures, heart failure, or hypothermia in the early postop period

Hyperthyroidism

- Frequent symptoms: palpitations, agitation, insomnia, diarrhea
- Struma ovarii no infrequently coexists with Graves disease, so it is important to monitor a patient’s thyroid function before and after surgery when struma ovarii is suspected
- Elevated beta-hCG in association with molar pregnancy can also cause hyperthyroidism
- Use of beta-blockers prior to D&C is important and those patients should be monitored for signs and symptoms of thyroid storm

Diagnosis

- CV Diseases
- 12-lead ECG is recommended for all patients older than 50 years; for patients with recent chest pain, DM, coronary artery bypass graft or angioplasty, high LDL levels
The goal of stress test is to get patient’s BP and Ps to 85% of their maximal heart rate for their ages with exercise

The exercise stress test is more sensitive for and specific for 3-vessel or left main coronary disease

The sensitivity may be as low as 50% for single-vessel disease

The PPV also depends on severity of the coronary disease

Patients who show signs of ischemia on an ECG early in the test (ie, low METs) have a higher risk of perioperative morbidity

The results of noninvasive testing usually are not absolutely conclusive, but they rather predict low-risk or high-risk outcomes

Patients with results interpreted as high-risk should be referred to a specialist for a possible coronary angiography with subsequent percutaneous coronary stents or coronary artery bypass prior to elective gynecologic surgery

Hematologic Problems

- CBC

Patients classified as ASA grades I and II in general do not require a coagulation profile

In all other patients (including ones on medications affecting coagulation), platelets (count and function), aPTT, PT and fibrinogen should be checked

Caucasian patients with a new diagnosis of DVT or PE should be tested for factor V Leiden, and if negative-testing for prothrombin G20210A should be considered
Pulmonary Diseases

- A chest X-ray is generally recommended as part of a routine preoperative evaluation in women older than 50 years, as well as for patients with known lung disease and long history of tobacco use.

- PFTs may be useful in predicting outcomes of after thoracic surgeries; however, its value before gyn and abdominal surgeries has not be proved.

Endocrine Diseases

- DM increases patient's risk of CAD and silent MI, so preoperative ECG is recommended, as well as electrolytes, Hgb A1c.

- Thyroid Disease – TSH

- Corticosteroid Users - testing of HPA axis with ACTH stimulation

- 30 min after 250 mcg of ACTH IV cortisol level less than 500 nmol/L indicates an inappropriate HPA axis response and the need for perioperative corticosteroids.

Prevention and Management

- CV – controlling BPs, blood glucose, reducing serum TGs.

- Women have a higher 1-year and 5-year mortality rate after their first MI than men.

- The use of beta-blockers has become a mainstay of preoperative medical management, as numerous studies have showed a reduction in perioperative ischemia and postoperative mortality with the use of beta-blockers initiated preoperatively.

- However, patients with no clinical predictors of cardiac risk may be harmed by perioperative beta-blockers.

- Patients with stents are usually treated with dual antiplatelet therapy in order to minimize the risk of stent thrombosis.

- At least one agent should be continued perioperatively, or elective surgery should be delayed. Generally, ASA is continued and clopidogrel is stopped for 7-10 days before surgery.
### Recommended Venous Thromboembolism Prophylaxis Based on Level of Risk

<table>
<thead>
<tr>
<th>Level of Risk</th>
<th>Risk Factors</th>
<th>Recommended Prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk</td>
<td>Minor surgery, Age less than or equal to 40 years</td>
<td>Early Mobilization</td>
</tr>
<tr>
<td>Moderate risk</td>
<td>Minor surgery with risk factors, Age 40-60 years without other risk factors</td>
<td>Low-dose unfractionated heparin (5,000 units every 12 hours) or Low molecular weight heparin (30 mg every 24 hours) or Intermittent pneumatic compression</td>
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<tr>
<td>High Risk</td>
<td>Age 60 years or less without risk factors, Age 40-60 years with other risk factors</td>
<td>Low-dose unfractionated heparin (5,000 units every 8 hours) or Low molecular weight heparin (40 mg every 24 hours) or Intermittent pneumatic compression</td>
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<td>Highest risk</td>
<td>Multiple risk factors including two or more of the following: Age greater than 60 years, Malignancy, Prior venous thromboembolism</td>
<td>Low-dose unfractionated heparin (5,000 units every 8 hours) or Low molecular weight heparin (40 mg every 24 hours) and Intermittent pneumatic compression Consider continuing prophylaxis for 2-4 weeks after surgery</td>
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**Warfarin Therapy**

- Should be stopped 1 week prior to surgery with starting enoxaparin injections (1 mg/kg bid or 1.5 mg/kg daily) with last injection 8-12 hrs before surgery

**Anemia**

- Defined as a Hct of less than 36%
- A prospective study of 300,000 veterans (mostly men) showed that even mild preoperative anemia increased the 30-day postoperative mortality and cardiac event rate in patients aged 65 and older
- The use of oral and IV iron, reduction of blood with use of leuprolide are important in prevention of intraoperative and postoperative transfusion
Pulmonary Diseases

• Asthma and COPD: preoperative management is based on the patient’s disease status

• If the patient is only taking bronchodilators with normal spirometry, she should start or continue taking inhaled corticosteroids 1 week before surgery

• In case of recent flare of pulmonary symptoms or abnormal spirometry (and who already taking inhaled steroids), oral prednisone should be considered and started 5 days preoperatively

Long-term oral steroid users (more than 20 mg of prednisone daily for more than 5 days), should receive perioperative stress-dose IV hydrocortisone to prevent postoperative addisonian crisis

• The usual regimen is 100 mg of hydrocortisone IV q 8 hrs from the morning of surgery until the patient is stable and able to resume the usual dose of prednisone

• Theophylline has been shown to cause ventricular arrhythmias in patients with asthma receiving inhaled anesthetics, plus it may antagonize the effects of neuromuscular blockers and BZDs - d/c preop!

Obstructive Sleep Apnea

• All patients should have bivale/or continuous positive airway pressure postoperatively and, ideally, should bring their own machine for proper fitting

• Early ambulation, use of IS should be encouraged, pulmonary toilet is imperative

• Non-narcotic pain management as much as possible, reverse Trendelenburg, prevention of fluid overload, continuous pulse oximetry in the immediate postoperative period may be considered

Endocrine Diseases

• DM

• Hold oral hypoglycemics starting the evening before surgery, reduce insulin for reduced caloric intake perioperatively

• !!! Patients with type I DM need a constant basal amount of insulin so DO NOT STOP it completely - they can go into DKA even with normal blood glucose

• For minor procedures: 2/3 of nl a.m. dose should be taken on the morning of surgery, unless it is a long-acting insulin (i.e. glargine), as it mimics baseline insulin secretion with steady levels of blood glucose
- Patients on pump can be kept on it if they have minor surgery, for major surgery, they should be converted to IV insulin infusion with recommended BG level in 120-180 mg/dl.

- Metformin—generally should be withheld for 48 hrs after any stress to the hepatic or renal systems (surgery, CT scans or other radiologic procedures with IV contrast dye) to avoid acute renal dysfunction.

- Thyroid Disease:
  - Hypothyroidism: can decrease cardiac output by 30-60%, is associated with arrhythmias, such as bradycardia and torsade de pointe; additionally, patients have increased peripheral vascular resistance and are more likely to have electrolyte disturbances such as hyponatremia and azotemia; slow return of bowel function after surgery.

- In case of severe hypothyroidism and a requirement of an urgent surgery, patients should be given IV T3 or T4, and endocrinology consult should be obtained.

- In immediate postoperative period, NPO status, IV levothyroxine dose should be reduced by 20-40% compared to oral due to the first pass effect.

- Hyperthyroidism: increased heart rate/myocardial contractility/cardiac output; 10-20% risk of a-fib.

- Thyroid storm soon after surgery: hyperthermia, tachycardia, confusion… cardiovascular collapse if untreated.

- But if thyroid storm occurs after induction of anesthesia, it may be confused with malignant hyperthermia. No response to dantrolene—check TSH, thyroxine.
- if hyperthyroidism or thyrotoxicosis is diagnosed perioperatively, a beta-blocker and antithyroid treatment (iodine, methimazole, propylthiouracil) should be initiated.
References

- Doyle RL. Assessing and modifying the risk of postoperative pulmonary complications. Chest 1999; 115:77-81. (Level III)