Preoperative Medical Care of the Surgical Patient

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Introduction

• “A chance to cut is a chance to cure”
• “Nothing heals like cold, hard steel”
• Surgery = stress and insults
  – Physiology of surgery
  – Maximize pre-operative condition of patient
  – Preoperative evaluation: H&P
  – Perioperative care: think of what can kill first...
First pants, THEN your shoes
Perioperative medical care:

- Surgical emergency
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
- Liver dysfunction
- Diabetics
- Bleeding disorders
- Malnourished
- Pregnancy
Perioperative medical care:

- Surgical emergency
  - Trauma
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
- Liver dysfunction
- Diabetics
- Bleeding disorders
- Malnourished
- Pregnancy
Surgical Emergency

- 76 yo WM “coded” in front of HLVI building; ACLS followed x 20 min with intermittent pulse return; intubated, IVs placed, brought to ER; SBP 60 with HR return
- MICU team called to eval; pt started on Neo-synephrine for bp
- Surgery called when Hct returned 14.2
Surgical Emergency

• What do you want to do?

  • HISTORY & PHYSICAL
    • History? (tailor to situation)
    • VS 70/20 135 16 (IMV) 36.4
    • “Pt is unconscious, intubated, not moving
      - abdomen is very distended, quiet BS”

• Keep DDx in mind during H&P
  • Why can’t he keep a bp?

• What do you want to do about it?
  • Risk of doing something vs. risk of doing nothing?

• What do you need to do before surgery?
Surgical Emergency

• AMPLE history
  – Allergies
  – Medications
  – Past medical history
  – Last meal
  – Events preceding the surgery
44 yo WF who presented to ER today with RUQ three days ago. RUQ U/S showed gallstones. CT scan of the abdomen/pelvis showed gallstones.
“Pre-op this patient”

- History and physical
- Informed consent for operation and blood
- Type and screen or type and cross
- CXR (age greater than 20)
- 12-lead ECG (age greater than 40)
- BMP, M/P, CBC, PT, PTT, INR
- NPO after MN (IV Fluids)
- Pre-op Note
- Pre-op Orders (hep 5000 units SQ, Abx, beta blocker)
- ?Bowel Prep
Pre-Op Labs and Studies

- CBC
  - Anemia
  - Malignancy
  - Renal Disease
  - Cardiac Disease
  - Pregnancy
Pre-Op Labs and Studies

• Chemistry
  – Diabetes
  – HTN
  – CVD
  – Renal Disease
  – Liver Disease
  – Diuretic Use
  – Elderly
Pre-Op Labs and Studies

• UA
  - Rarely Needed, only if symptomatic

• CXR
  - Rarely indicated as screening tool

• EKG
  - Males >40, Females >50 ?baseline
  - History of CVD, DM, HTN
  - Planned thoracic, aortic, intraperitoneal or emergency surgery
Symptomatic Cardiac Disease
Work Up

- History of event
- Physical exam
- 12-Lead ECG
- CXR
- ABG
- Cardiac Panel
- BMP, M/P, CBC, PT, PTT, INR
- Chart Review
Finding Cardiac Disease in the Asymptomatic Patient

- Abnormal vital signs
- Assess functional status
- Tachycardia
- JVD at 30 degrees
- Bruits
- Pedal Edema
- Rubs and 3\textsuperscript{rd} heart sounds
- Murmurs
  - Most apical systolic murmurs are innocent
  - Any murmur with a thrill or any diastolic are NOT innocent
Cardiac disease in peri-op period

- MI
- arrhythmias
- CHF

- CAD can cause any of these
- Risks for CAD:
  - age, sex, HTN, XOL, DM, tobacco
- Modify those risk factors you can...

medical therapy  will cover later...
Coronary Artery Disease

- **Definition of CAD**...

- **Physiology of surgery**:
  - ↑ myocardial oxygen demand
  - ↑ catecholamines: ↑ HR, ↑ contractility, ↑ PVR
  - ↑ HR also causes decreased diastolic filling
    - Coronary arteries fill in diastole
    - Less blood flowing in coronaries: less myocardial O₂ supply
Myocardial Infarction

• Pt without risks has 0.5% chance of MI
  – Pt with risks has 5% chance of perioperative MI
• Perioperative MI has 17-41% mortality
• CAD causes MI....look at PMH
• Risk stratifications:

<table>
<thead>
<tr>
<th>MI w/in 3 months of OR</th>
<th>27% reinfarction rate</th>
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<tbody>
<tr>
<td>MI 3-6 months before OR</td>
<td>10% reinfarction rate</td>
</tr>
<tr>
<td>MI &gt;6 months of OR</td>
<td>5-8% reinfarction rate*</td>
</tr>
</tbody>
</table>
Prevention of perioperative cardiac events

1) Wait 6 months if possible
2) Beta-blockade*
   - 200 pts with CAD or risk factors for CAD
   - atenolol pre-op and peri-op in ½
   - MI reduced 50% in first 48h
   - *2 year mortality 10% vs 21%
3) Maintain peri-operative normothermia
   - ↓ cardiac events, esp. arrhythmias
4) Treat peri-operative hypertension

Prevention of perioperative cardiac events

7) Watch for and treat arrhythmias

Causes?  
Drugs, electrolytes, ischemia, fluid shifts, body T

Treatment?  
underlying cause, rate control, conversion
Perioperative medical care:

- Surgical emergency
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
- Liver dysfunction
- Diabetics
- Bleeding disorders
- Malnourished
- Pregnancy
Pulmonary disease

- Patient-related risks
  - Chronic lung dz – wheeze, productive cough
  - Smoking
  - General health
  - Obesity
  - Age?
    - separate from others?
Pulmonary Disease

• Procedure related risks
  – Type of anesthesia
    • GETA alone ↓ FRC 11%
    • inhibited cough/mucociliary function
  – Surgical site
    • Increased with midline incision or dissection of upper abdomen and with thoracotomy
  – Duration of surgery
    • Longer duration of GETA increases risk of pulmonary complications
    • V/Q mismatching due to positioning
Modifiable Pulmonary Risks

- **Obstruction to flow**
  - COPD
  - Asthma

- **Obesity physiology**
  - ↓ lung capacity, FRC, VC
  - ↑ WOB, ATX, Secretions
  - hypoxemia

- **Tobacco**
  - Rel Risk 2-6x > vs Non Smoker
  - Definition of “stopped smoking”....
  - “When was your last cigarette?”
Pre-operative risk assessment: pulmonary function

- **Patient history**
  - Functional Status
  - Unexplained dyspnea, cough, reduced exercise tolerance, OSA

- **Physical exam:**
  - Wheeze, rales, rhonchi, ↑ exp time, ↓ BS, loose rattle w/forced cough (can reveal underlying pathology)
  - **5.8x more likely to develop pulmonary complications***
  - FEV1 Screening

- **Pre-operative CXR** over 40, without a baseline should be considered

- **ABG**
  - No role for routine use

* Lawrence *et al* Chest 110:744, 1996
Perioperative medical care:

- Surgical emergency
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
  - Dialysis dependent
- Liver dysfunction
- Diabetics
- Bleeding disorders
- Malnourished
- Pregnancy
Renal Dysfunction

- Not all renal failure is oliguric
- H&P
- Check BUN/Cr, CBC
- Assume DM have CRI
  - Volume status
    - Overload and hypotension are common
  - Electrolytes.....sequelae?
    - Watch K, Ca, Mag, Phos, HCO3
- Drug metabolism
  - Be aware of nephrotoxic agents
  - CAUTION w/Succinylcholine
Renal dysfunction

- Dialyze preop to improve electrolytes, volume status
- No K\(^+\) in MIVF
- Very judicious MIVF while NPO
- *Altered drug metabolism*
- Altered platelet fxn
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Why does hepatic disease cause coagulopathy?
## Child-Pugh Criteria for Hepatic Reserve

<table>
<thead>
<tr>
<th>Measure</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bilirubin</strong></td>
<td>&lt;2.0</td>
<td>2-3</td>
<td>&gt;3.0</td>
</tr>
<tr>
<td><strong>Albumin</strong></td>
<td>&gt;3.5</td>
<td>2.8-3.5</td>
<td>&lt;2.8</td>
</tr>
<tr>
<td><strong>Prothrombin Time (PT) increase</strong></td>
<td>1-3</td>
<td>4-6</td>
<td>&gt;6</td>
</tr>
<tr>
<td><strong>Ascites</strong></td>
<td>None</td>
<td>Slight</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Neuro</strong></td>
<td>None</td>
<td>Minimal</td>
<td>“Coma”</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>&lt;10%</td>
<td>10-40%</td>
<td>40-80%</td>
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Child-Pugh Criteria for Hepatic Reserve

- Etiologies of liver disease include:
  - Nutritional, Alcohol Abuse
  - Infectious
  - Idiopathic

- Physical Exam
  - Stigmata of liver disease

- Lab Work Up
  - LFT’s and Hepatitis Screening
  - PT, PTT, Platelets, INR, Bleeding Time

- Correct what you can → vitamin K, FFP
  - Anticipate bleeding, complications

(more later . . . )
Perioperative medical care:

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Patients with special preoperative needs

- 37 yo WM with longstanding type I DM and with ESRD for 20 years, HD dependent, severe retinopathy, and s/p multiple LE amputations for non-healing diabetic ulcers.
- Admitted for Abx for wound infection
- Evening RN calls you for “nausea and sweating”
Patients with diabetes

• Goal:
  – Achieve Euglycemia
    • What is “Euglycemia”
      – Facility and Provider dependent
      – In general 150 – 200 mg/dl

• Increased Perioperative Risks
  – Metabolic
    • Hypoglycemia and Hyperglycemia
  – Silent Cardiovascular Disease
  – Infection
Patients with diabetes

• Hyperglycemia facilitates infection
  – Warm medium with food for bacteria
  – Inhibits wound healing

• Treat suspected infection aggressively

• Tight glucose control has been shown to improve outcome of septic patients in the ICU
  – May require insulin in previously diet or oral medication controlled patients
  – Watch for symptoms of DKA in Type 1 & 2 DM
Perioperative medical care:

- Surgical emergency
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
- Liver dysfunction
- Diabetics
- Bleeding disorders
  - Iatrogenic
  - Inherited
- Malnourished

Reasons patients are placed on anticoagulants:

- Atrial fibrillation
- Prosthetic heart valve
- DVT or PE
- CVA or TIA
- Hypercoagulable state

REVIEW: Merritt J Thrombosis and Thrombolysis 13(2), 97-103, 2002
Evaluation of patients for hemostatic disorders

- **History:**
  - Easy bruising, epistaxis
    - Cut when shaving
    - Heavy menstrual bleeding
  - Family history of bleeding disorders
  - ASA / NSAID’s
  - Renal disease
  - Hepatic disease (EtOH)

- **Physical:**
  - Ecchymoses
  - Hepatosplenomegaly
  - Excessive mobility of joints or excess skin laxity
  - Stigmata of renal or hepatic disease
Laboratory tests of bleeding function

• Prothrombin time (PT/INR)
  – Measures factor VII and common pathway factors
    (factor X, prothrombin/thrombin, fibrinogen, and fibrin)

• Partial thromboplastin time (PTT)
  – Intrinsic pathway and common pathway

• Platelet count quantifies platelets

• Bleeding time estimates qualitative platelet function
Patients who are iatrogenically anticoagulated

- **Coumadin** (warfarin)
  - Blocks vit K dependent factors (II, VII, IX, X)
  - Effect measured with PT / INR
  - *In general, want patients* < 1.5 (ACS: 1.7)
  - $t_{1/2} = 48h$
  - Reaction:
Patients who are iatrogenically anticoagulated

• Aspirin (ASA)
  – Irreversibly acetylates COX, which blocks production of thromboxane A2
  – decreases platelet aggregation
    • Physician’s Health Study\(^1\)
      – primary prevention trial of 22,000 MD’s
      – 325 mg ASA qod vs. placebo
      – At 5 yrs, Rx group had 87% reduction in incidence of MI
  – Renders platelet dysfunctional for life
  – Half-life of platelet: 1 week

Patients who are iatrogenically anticoagulated

- Heparin – potentiates antithrombin III
  - Effect measured with PTT
  - $t_{1/2}$ 45-90 minutes
  - Check PTT q6h
  - Dosing:
    - Therapy: bolus dose 80 U/kg; IV infusion 18 U/kg/hr
    - Prophylaxis: 5000 U sq BID
  - Reaction: *Heparin Induced Thrombocytopenia*
  - Fragmin (dalteparin), Lovenox (enoxaparin)
    - Require less frequent monitoring
Patients who are iatrogenically anticoagulated

- **Thienopyridines**
  - inhibit ADP-induced platelet aggregation
  - Plavix (clopidogrel)
  - Ticlid (ticlopidine)

- **GIIb/IIIa inhibitors**
  - Abciximab
    - Murine chimeric monoclonal antibody Fab fragment that binds to the GP IIb/IIIa receptor
Inherited bleeding disorders

• Hemophilia A
• Hemophilia B (Christmas disease)
• Protein C or S deficiency
• von Willebrand’s disease
• Factor V leiden

• Antithrombin III deficiency
• Anti-phospholipid antibody syndrome
• . . . Other factor deficiencies (rare)
Perioperative medical care:

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Patients who are malnourished

- Proteins are essential for healing and regenerating tissue
- Malnourished patients have
  - Higher wound complications (dehiscence) and greater anastomotic leak rate
  - More postoperative muscle weakness (diaphragm)
  - Longer time in rehabilitation
Treating malnourishment

- “If the gut works, use it.”
- TPN vs. enteral feeds
- Preoperative “bulking up”
  - Gastric and esophageal cancers
    - Why are they malnourished?
  - How do you bulk someone up?
Pregnancy

- Uterus can displace abdominal viscera
- Inferior vena cava compression
- Physiologic Changes of Pregnancy
  - Increased
    - HR, Stroke volume, Plasma volume, Hgb, RR, TV
  - Decreased
    - HCT, PCO2, gastric emptying
- Best time frame for elective surgery
  - 2nd Trimester
Perioperative medical care:

(SUMMARY)

- Surgical emergency ➔ AMPLE history
- Cardiac disease ➔ Wait 6 months, Beta block, MONAB
- Pulmonary disease ➔ Risk stratify (patient, family, surgery team)
- Renal dysfunction ➔ Monitor e’lytes, volume closely
- Liver dysfunction ➔ Correct coagulopathy; risk stratify
- Diabetics ➔ Glucose control, anginal equivalents
- Anticoagulated ➔ Reverse anticoagulation if tolerated
- Malnourished ➔ Anticipate and plan
- Feed enterally
- Pregnancy ➔ Be aware of normal physiologic changes and the effect on presentation

UTMCK