## **Perioperative Medical Care** of the Surgical Patient

South College PA Surgery Curriculum

Brian J. Daley, MD

The **FURE** of Medicine

## 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...



## **Perioperative medical care:**

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



## **Perioperative medical care:**

- Surgical emergency
  - Trauma
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
- Liver dysfunction
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## **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**

UTMCK

- 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

## **Perioperative medical care:**

- Surgical emergency
- Cardiac disease
  - CHF
  - HTN
  - CAD
- Pulmonary disease
- Renal dysfunction
- Liver dysfunction
- Diabetics
- Bleeding disorders
- Malnourished



## **Chest Pain Work Up**

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

## **Tachycardia**

- Delivery O2=1.34 hgb X O2 sat X SV X HR
- Hypovolemia (Think Bleeding)
- Anemia
- Hypoxemia
- MI
- Arrhythmia
- **PE**
- Pain
- anxiety



• CAD can cause any of these

*medical therapy* 

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

UTMCK

will cover later. . .

## **Coronary Artery Disease**

• Definition of CAD....



- <u>Physiology of surgery</u>:
  - † myocardial oxygen demand
  - $-\uparrow$  catecholamines:  $\uparrow$  HR,  $\uparrow$  contractility,  $\uparrow$ PVR
  - $\uparrow$  HR also causes decreased diastolic filling
    - Coronary arteries fill in diastole
    - Less blood flowing in coronaries: less myocardial O<sub>2</sub> 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....<u>look at PMH</u>
- Risk stratifications:

MI w/in 3 months of OR	27% reinfarction rate	
MI 3-6 months before OR	10% reinfarction rate	
MI >6 months of OR	5-8% reinfarction rate*	



## **Myocardial infarction**

- O<sub>2</sub> supply / demand imbalance: ANGINA
   Surgical stress increases demand
- Treatment "MONAB"
  - Morphine
  - Oxygen
  - $-\underline{N}itroglycerin$
  - <u>A</u>spirin
  - Beta-blockers
- Cardiac panel (troponin, CK-MB), ?Heparin



## 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  $\frac{1}{2}$
  - MI reduced 50% in first 48h
  - 2 year mortality 10% vs 21%
- 3) Maintain peri-operative normothermia
  - $\downarrow$  cardiac events, esp. arrhythmias
- 4) Treat peri-operative hypertension

## Prevention of perioperative cardiac events

- 5) Invasive monitoring (Swan Ganz) no help
- 6) Pre-op CABG (CARP trial) no difference

American College of Cardiology / AHA now recommends CABG in preop pts who ordinarily meet CABG criteria:

- 1. L main dz
- 2. 3V dz with LV dysfxn
- 3. severe prox LAD stenosis
- 4. MI despite maximal medical Rx

## Prevention of perioperative cardiac events

7) Watch for and treat arrhythmias



Drugs, electrolytes, ischemia, fluid shifts, body T

Treatment?

Causes?

underlying cause, rate control, conversion



## **Perioperative medical care:**

- Surgical emergency
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
- Liver dysfunction
- Diabetics
- Bleeding disorders
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## **Pulmonary disease**

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

- Procedure related risks
  - Type of anesthesia
    - GETA alone  $\downarrow$  FRC 11%
    - inhibited coughing peri-op
  - Surgical site
  - Duration of surgery



## Modifiable pulmonary risks

- Obesity physiology

   ↓ lung capacity, FRC, VC
   ↑ WOB
  - hypoxemia
- Tobacco
  - Definition of "stopped smoking"....
  - "When was your last cigarette?"





### "Surgeons as medical doctors"

## **Smoking cessation**

- 83% of patients think MD's are against smoking
   55% think THEIR DOCTOR is against it
- 55% say their MD has never advised to quit smoking
   despite that 22% say MD inquired of smoking hx
- MD can make a difference
  - 81% have tried to quit if MD says to
  - 61% have tried to quit if MD says nothing
- Pts less likely to try to quit if advised to "cut down"

## Pre-operative risk assessment: pulmonary function

- Patient history
  - unexplained dyspnea, cough, reduced exercise tolerance, OSA
- Physical exam:
  - wheeze, rales, rhonchi,  $\uparrow$  exp time,  $\downarrow$  BS
  - <u>5.8x more likely to develop pulmonary complications</u>\*
- Pre-operative CXR is mandatory over 40 yo
- ABG
  - no role for routine use
  - result should not prohibit surgery
    - caution if  $\uparrow$  PaCO<sub>2</sub>



\* Lawrence *et al* <u>Chest</u> 110:744, 1996

## **Perioperative medical care:**

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



## **Renal dysfunction**

- Not all renal failure is oliguric
- H&P
- Check BUN/Cr
- Assume DM have CRI
  - Volume status
  - Electrolytes....sequelae?
    - Which ones?
- Drug metabolism



## **Renal dysfunction**



- Dialyze preop to improve electrolytes, volume status
- No K<sup>+</sup> in MIVF
- Very judicious MIVF while NPO
- Altered drug metabolism
- Altered platelet fxn



## **Perioperative medical care:**

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

Why does hepatic disease cause coagulopathy?



## Child-Pugh Criteria for Hepatic Reserve

Measure	A	B	С
Bilirubin	<2.0	2-3	>3.0
Albumin	>3.5	2.8-3.5	<2.8
Prothrombin Time (PT) increase	1-3	4-6	>6
Ascites	None	Slight	Moderate
Neuro	None	Minimal	"Coma"

## Child-Pugh Criteria for Hepatic Reserve

- Predictor of perioperative mortality
  - Class A: 0 5%
  - Class B: 10 15%
  - Class C: > 25%
- Correct what you can  $\rightarrow$  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**

- Possible occult CAD (diabetic neuropathy)
  - Look for "anginal equivalents"
    - SOB
    - Nausea
  - "All patients with longstanding DM have CAD"
- EKG, cardiac enzymes

## **Patients with diabetes**

- Hyperglycemia facilitates infection
   Warm medium with food for bacteria
- Treat suspected infection aggressively
- <u>Tight glucose control</u> has been shown to improve outcome of septic patients in the ICU



## **Perioperative medical care:**

- Surgical emergency
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
- Liver dysfunction
- Diabetics
- Bleeding disorders
  - Iatrogenic 4
  - 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**

#### • <u>History</u>:

- Easy bruising, epistaxis
  - Cut when shaving
  - Heavy menstrual bleeding
- Family history of bleeding disorders
- ASA / NSAID's
- Renal disease
- Hepatic disease (EtOH)
- <u>Physical</u>:
  - 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

- 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:



- Aspirin (ASA)
  - Irreversibly acetylates COX, which blocks production of thromboxane A2
  - decreases platelet aggregation
    - Physician's Health Study<sup>1</sup>
      - 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
    - MONAB....
  - Renders platelet dysfunctional for life
  - Half-life of platelet: 1 week

- Heparin potentiates antithrombin III
  - Effect measured with **PTT**
  - $t_{\frac{1}{2}} 45-90 \text{ minutes}$
  - 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

- 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)



## Warfarin-induced skin necrosis



• protein C and S are vitamin K-dependent anticoagulants

- shorter  $t_{\nu_2}$  than factors II, VIII, IX, X
- depleted first upon initiation of coumadin
- Transient <u>hyper</u>coagulation

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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?





## **Perioperative medical care:** (SUMMARY)

- Surgical emergency **AMPLE history**  $\bigcirc$
- Cardiac disease
- Pulmonary disease  $\bigcirc$
- $\bigcirc$
- Liver dysfunction  $\bigcirc$
- Diabetics  $\bigcirc$
- Anticoagulated  $\bigcirc$
- Malnourished

- Wait 6 months, Beta block, MONAB
- **Risk stratify** (patient, family, surgery team)
- Renal dysfunction —— Monitor e'lytes, volume closely
  - Correct coagulopathy; risk stratify
    - **——** Glucose control, anginal equivalents
      - **—** Reverse anticoagulation if tolerated Anticipate and plan
      - ----- Feed enterally

## **Patient Flow**

#### **Pre - op Assessment and Plan**



## In Class Assignment

- Write Pre-op Orders, Op Note and Post – op orders
- 48 y/o woman with gallstones, NKA on Zoloft and Avandia



## **Pre-op Orders**

- Define Procedure
- NPO
- Consent
- Antibiotics, prophylaxis



## **Op Note**



- Pre/Post op Diagnosis
- Procedure
- Surgeons
- Findings
- Specimens
- EBL, Fluids, drains, tubes
- Disposition

## **Post op Orders**

- Where to, Dx, Doctor
- Nursing (VS, diet, activity, I&O)
- IV
- Meds
- Tubes
- Treatments
- Tests
- Alarms



## Post op care



- 60% of surgery is outpatient
- New category of post op care
- Starts before OR in office
- Reinforced pre-op
- Seal the deal post-op

## **Answering service**

- Call about pain
- More calls about pain
- Family member calling about pain
- Post –op expected outcomes or complications
- Unexpected events



## **Answering service**



- Know the patient
- Know the source
- Know the problem
- Know the expected outcomes
- Know when to refer
  - Tonight
  - Tomorrow
  - As scheduled

## **Recovery Room Calls**

- Emergence from anesthesia
- Emergent post –op problems
- Bleeding, bleeding, bleeding
- Loss of reduction/repair/tube
- Follow up tests
- Coordinate HR, >BP, chest pain, pain pain with anesthesia

## **Tubes**



- ET
- NG
- Chest
- Drain
- G/J
- Ostomy
- Foley

## **Care of Tubes**

- Document reason
  - Why we did this...
- Measurement
  - How much out or in....
- Purpose
  - IS it doing what we wanted it to do....
- Pitfalls

## Post – op Fever

- Wind
- Water
- Wound
- Walking
- Wonder Drug



## **Atelectasis**



- Micro –collapse of alveoli
- Begins with decreased FRV
  - Decrease ventilation
  - Decreased volume
- Precursor to pneumonia
- Increase Respiratory
   Volumes

## Wound

- Surgical Sites
  - Superficial
  - Superficial Space
  - Organ Space
- Signs of Infection
  - Rubor
  - Tumor
  - Dolor
  - Calor



## Wound Dehiscence



- Technical Failure
- Infection
- Signs
  - Copious serosanguinous fluid
  - Cover with sterile dressing
  - To OR

## Pain

- Nocioreceptors
- Cerebral Factors
- Anxiety
- Inflammation
- Treatment
  - Reduce Inflammation
  - Cerebral Treatment
  - Manage Expectations



## Pain Mangement



- Adjuncts

   Rest, Ice , Compression, Elevation
  - Rx
- NSAI
  - First Line
  - Narcotics
  - Second Line
  - Acute v. Chronic

## **Prophylaxis**

- DVT
  - Chemical
  - Mechanical
- Peptic Ulcer
  - Acid Reduction
- Infection
  - Antibiotics
  - Skin Prep
  - Dressings

