Preoperative Medical Care of the Surgical Patient

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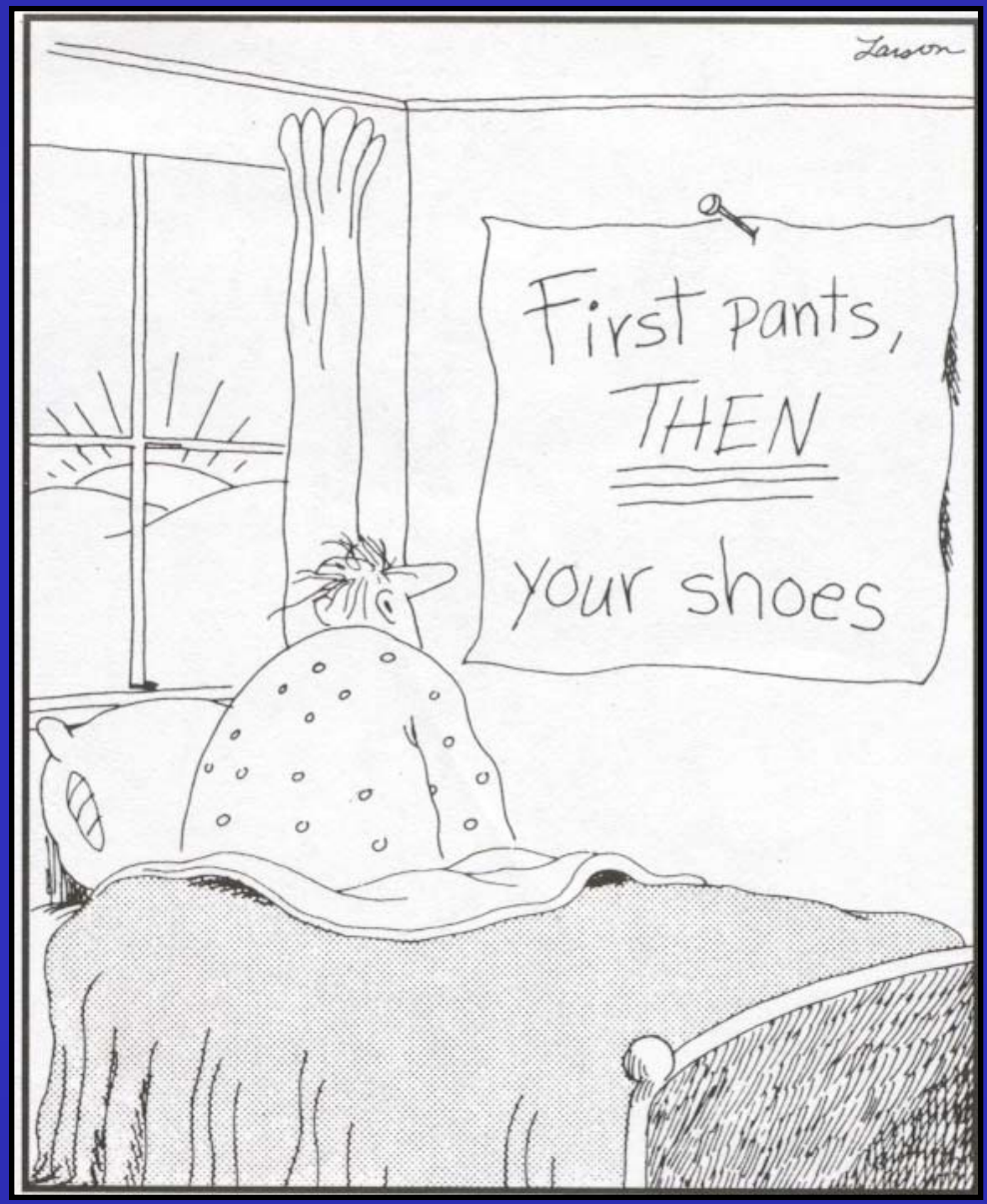
Introduction

- "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...


Larson
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
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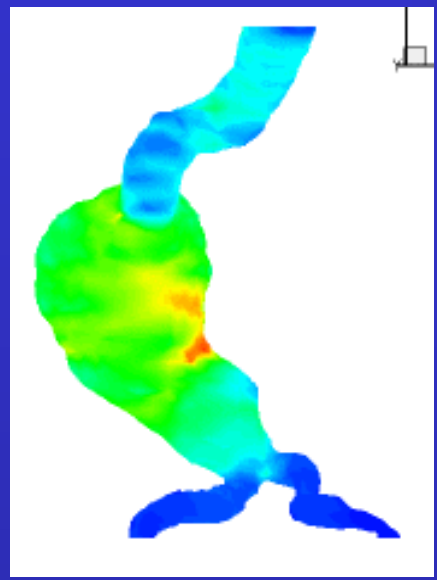
Surgical Emergency

- 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

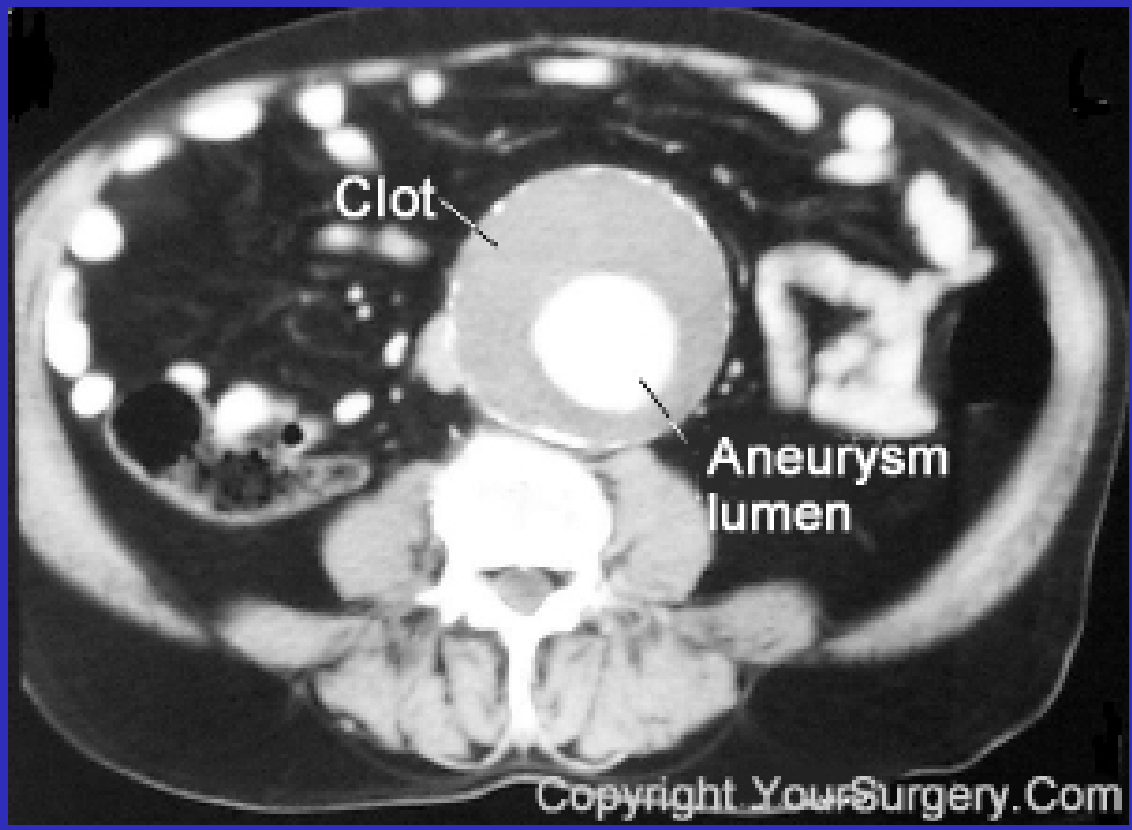
Surgical Emergency

- *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


Clot
Aneurysm
lumen
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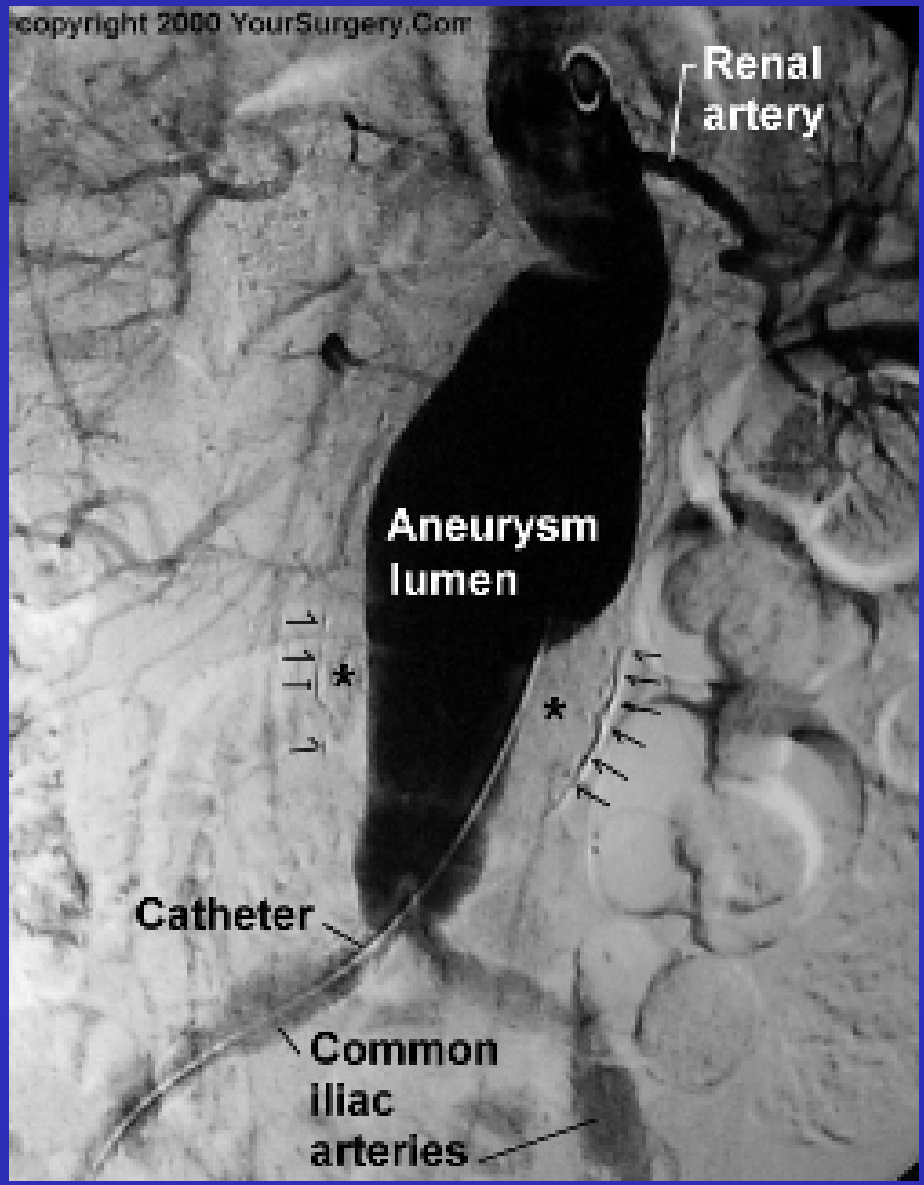

Renal artery
Aneurysm lumen
Catheter
Common iliac arteries

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 3rd 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**

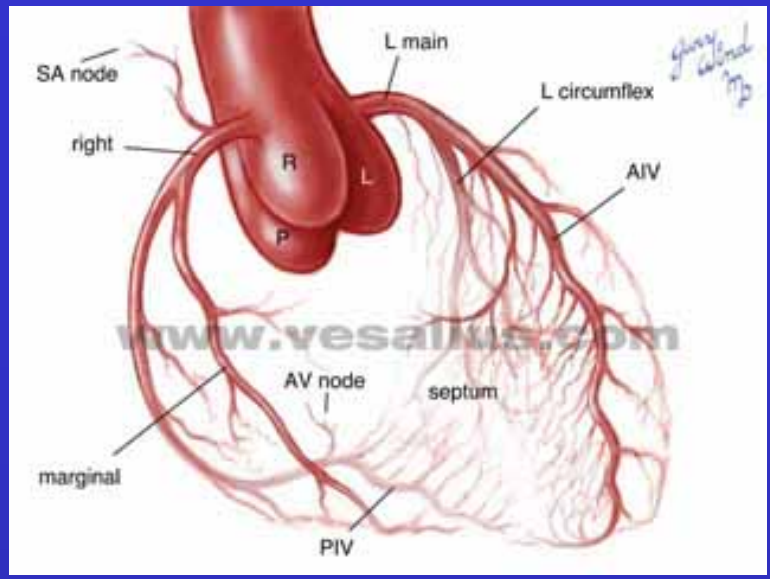
- CAD can cause any of these
- Risks for CAD:
  - ~~age~~, ~~sex~~, HTN, XOL, DM, tobacco
- Modify those risk factors you can...

medical therapy

will cover later. . .

Coronary Artery Disease

- Definition of CAD....

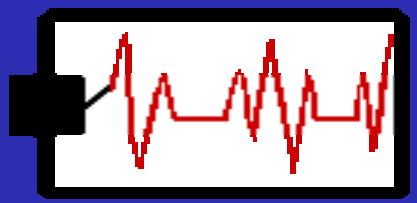


- Physiology of surgery:
  - ↑ myocardial oxygen demand
  - ↑ catecholamines: ↑ HR, ↑ contractility, ↑PVR
  - ↑ HR also causes decreased diastolic filling
    - Coronary arteries fill in diastole
    - Less blood flowing in coronaries: less myocardial O_2 supply

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:

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*

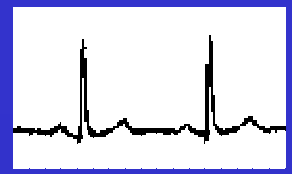


Prevention of perioperative cardiac events

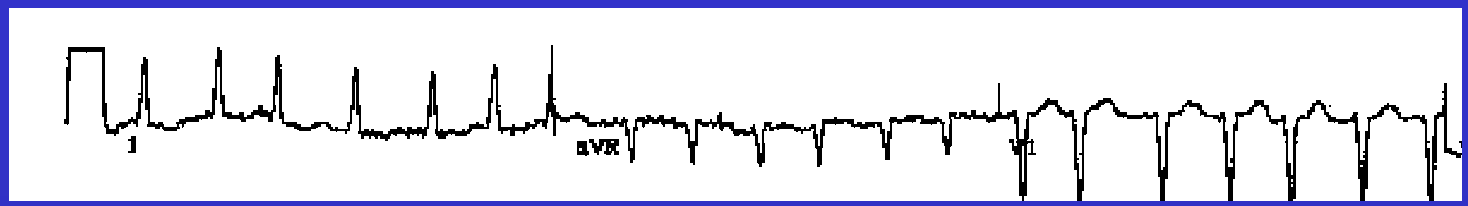
1) Wait 6 months if possible
2) Beta-blockade*
   - 200 pts with CAD or risk factors for CAD
   - atenolol pre-op and peri-op in ½
   - MI reduced 50% in first 48h
   - ***2 year mortality 10% vs 21%***
3) Maintain peri-operative normothermia
   - ↓ cardiac events, esp. arrhythmias
4) Treat peri-operative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

* Mangano NEJM 335:1713, 1996.

Prevention of perioperative cardiac events



7) Watch for and treat arrhythmias

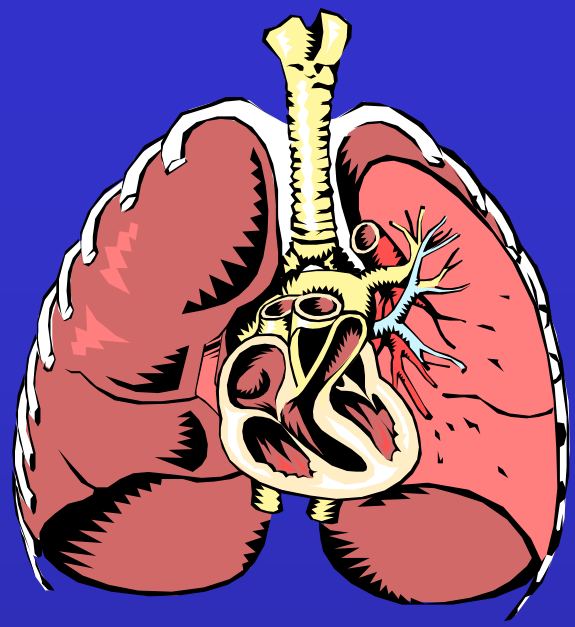


Causes? *Drugs, electrolytes, ischemia, fluid shifts, body T*

Treatment? *underlying cause, rate control, conversion*

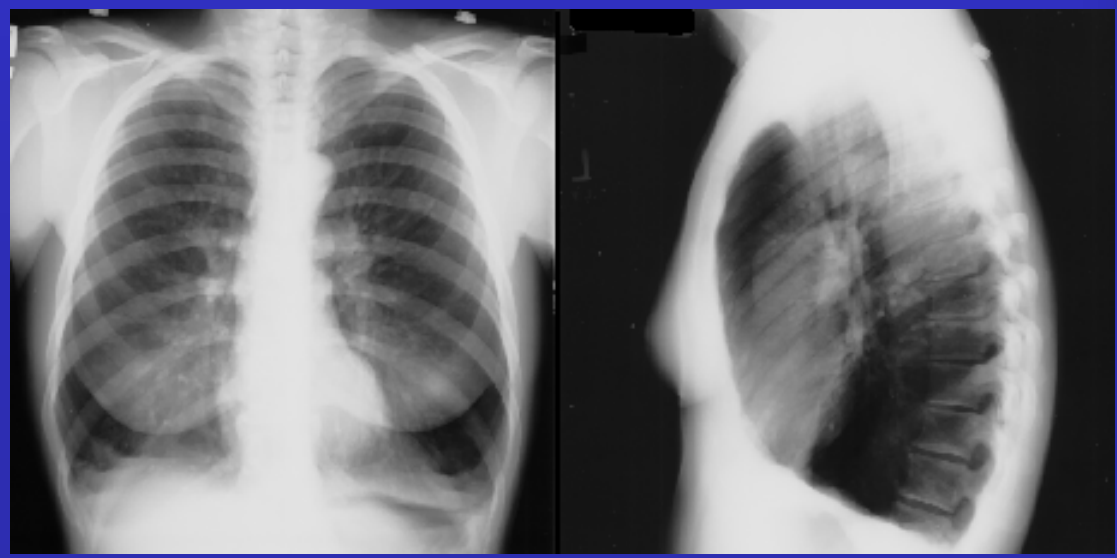
Perioperative medical care:

- 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?

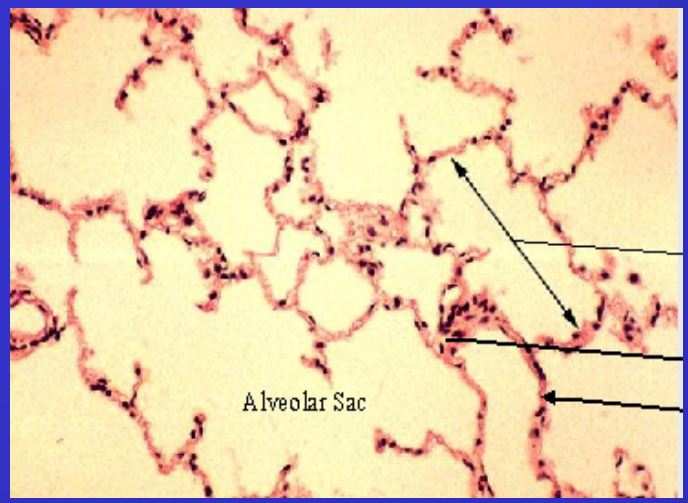


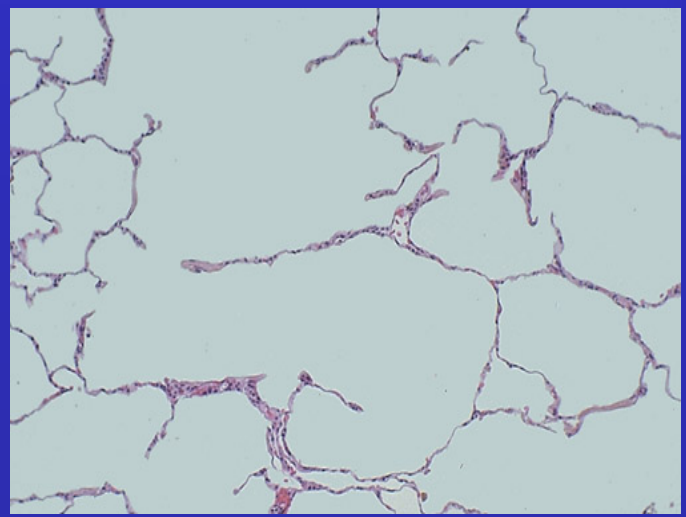
Pulmonary Disease

- 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

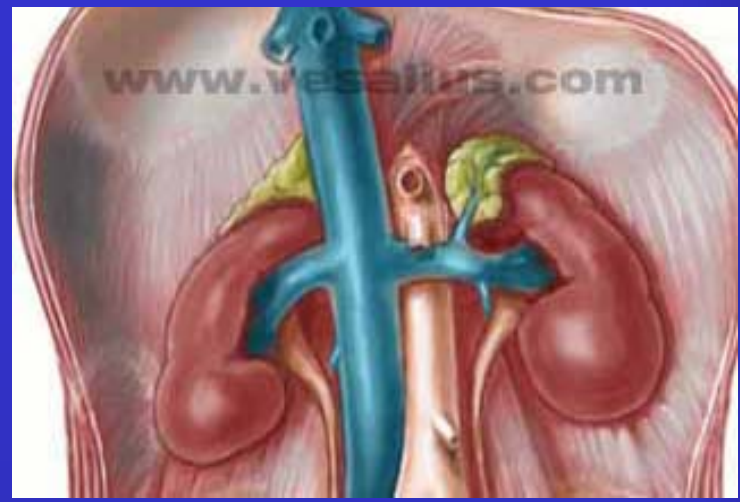
- Patient history
  - Functional Status
  - Unexplained dyspnea, cough, reduced exercise tolerance, OSA
- Physical exam:
  - Wheeze, rales, rhonchi, ↑ exp time, ↓ BS, loose rattle w/forced cough (can reveal underlying pathology)
  - **5.8x more likely to develop pulmonary complications***
  - **FEV1 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:

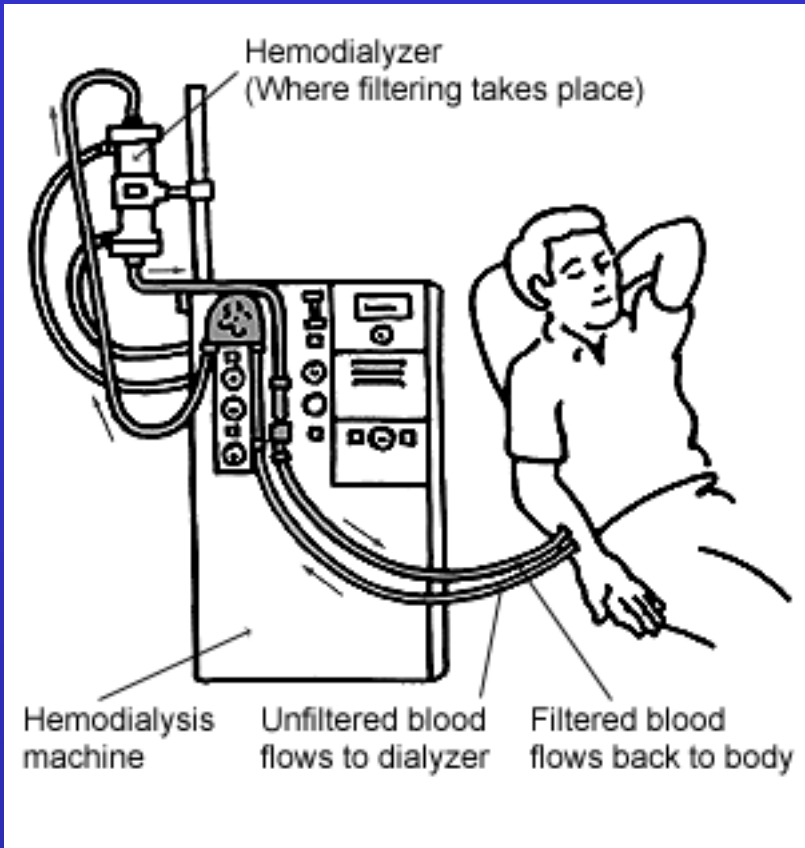
- Surgical emergency
- Cardiac disease
- Pulmonary disease
- Renal dysfunction
  - Dialysis dependent
- Liver dysfunction
- Diabetics
- Bleeding disorders
- Malnourished
- Pregnancy

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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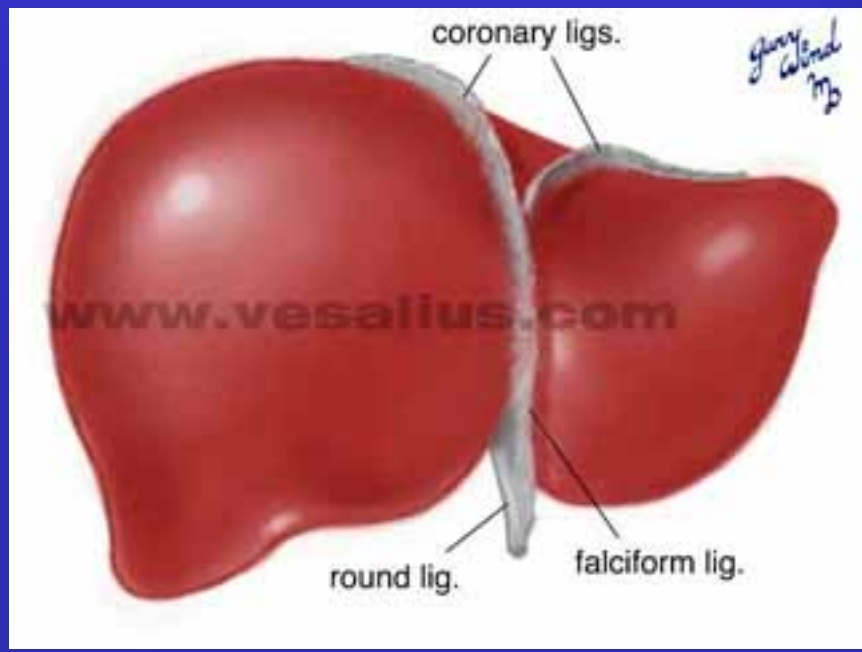
Why does hepatic disease cause coagulopathy?



Child-Pugh Criteria for Hepatic Reserve

Measure	A	B	C
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"
Mortality	<10%	10-40%	40-80%

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 . . . .)

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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

[1]Ridker *et al* Ann Intern Med 114:835-839, 1991.

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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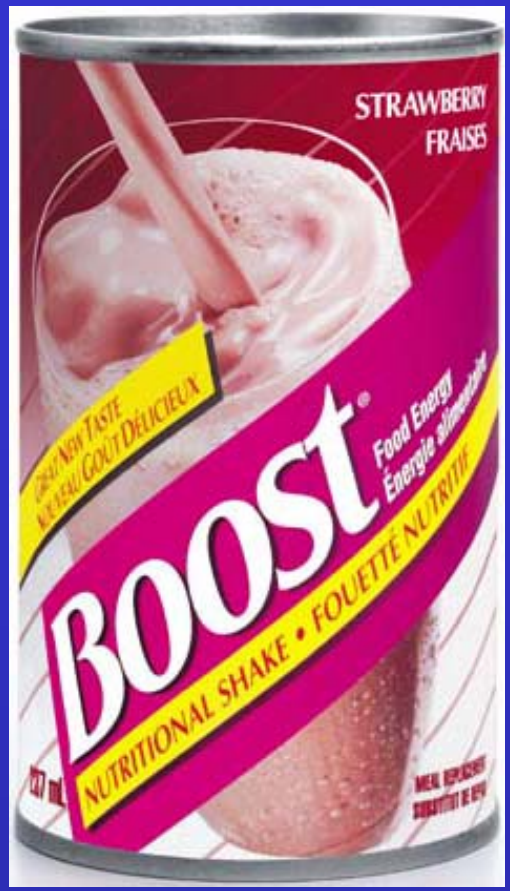
- Liver dysfunction
- Diabetics
- Bleeding disorders
- Malnourished

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
	→	Anticipate and plan
• Malnourished	→	Feed enterally
• Pregnancy	→	Be aware of normal physiologic changes and the effect on presentation