Disclaimer: As we all know, we are all still students and henceforth bound to make mistakes, however, we will try our very best to convey all knowledge based on the Malaysian protocols. By that, we do not hold any responsibilities should our presentations bear mishaps in the future.
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       : varicose vein by Rebecca
Pneumothorax by Suriya Eh Qurut
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MEDICAL CONSENT

Definition = is a phrase often used in the law to indicate that the consent a person gives meets certain minimum standards. As a literal matter, in the absence of fraud, it is redundant.

TAKING CONSENT FROM ‘COMPETENT PATIENT’

- The ability to give informed consent will be governed by a general requirement of competency.
- In common law jurisdictions, adults are presumed competent to consent.
- This presumption can be rebutted, for instance, in circumstances of mental illness or other incompetence.
- The attitude of doctors in taking the consent from patients:

1) Doctors should explain the importance of the surgery or manipulation that needs to be done on patient.
2) Doctors should use simple language that can be understood by the patient. Don’t use medical terms if the patient doesn’t have any background of medical knowledge. (In case if the patient can’t understand your language, you should ask nurse or MA to translate for you)
3) Doctors should be firm to patient about the needs of doing the surgery or manipulation. (p/s it doesn’t mean doctors have to be fierce)
4) If the patient can’t make decision or need to discuss with their family members, doctors should explain once again for the close family members about the procedures that need to be done.
5) Finally, if the patients still doesn’t wish to do the surgery, doctors should respect the decision and try to prolong the patient’s life as much as we can.

In children:

- Generally, parents are given the authority to give consent for children under 18 y.o.
- Although it’s so, parents don’t have final say about what to do done on the children, the children’s best interest is the main consideration. (Parents can reject the surgery but if doctors believe surgery is of best interest for children, the parents’ will be brought to court and tx can be authorized without parents’ consent.

Child act 2001- temporary protective custody by Dept. of Social Welfare or police officer.

TAKING CONSENT FROM ‘INCOMPETENT’ PATIENTS

- Incompetent patients = a person who is unable to give consent himself, such as unconscious patients, minors and mentally incapacitated patients.
- Mentally disordered patients:

  - Mental Disorder Ordinance 1952:
    - if the mental condition of the patient is unsound, an application has to be made to court.
~if the court finds that patient can’t make decision and unable to understand (unsound), a committee will be in charge and decide for the patient.

~Disadvantages:

- The patient is able to understand a part of his condition and refuses the treatment

May not cover elective procedures where tx is deemed helpful for patient, but may not be needed immediately.

- When there is doubt, need to apply to court for declaration that the treatment is the best for patient.

- Mental Health Act 2001:

~if the patient can understand the nature of his disease or treatment even not completely, the patient should give consent for his treatment.

~if the patient’s comprehension is in doubt, the he should be sent to psychiatrist to assessment.

- Private Healthcare Facilities and Services Regulations 2006:

~Consent can be obtained from spouse, parents or next of kin if the patients are mentally and physically disabled before the procedures.

~It’s arguable because this Regulation outs both mentally and physically disabled patients under the same category.

- Emergency situations

~ it is a general rule that life-saving measures can be carried out even though the patient is unable to consent. (the law assumes that if the patient was conscious, he would consent to procedures that will preserve his life)

~Can only carry out procedures or tests that are life-saving. Other elective procedures will have to be postponed.
Acute Abdomen

Surgical causes

**LUQ**
- Gastritis
- PUD
- Reflux esophagitis

**LIF**
- Sigmoiditis
- Diverticulitis
- Perforated colon
- Ulcerative Colitis

**Epigastric**
- Pancreatitis
- Gastritic
- PUD
- Aortic dissection
- Mesenteric Ischemia

**Periumbilical**
- Early appendicitis
- PUD
- SBO
- Aortic dissection
- Mesenteric ischemia
- Gastritis

**Suprapubic**
- Appendicitis
- Colitis
- Diverticulitis

**RUQ**
- Cholecystitis
- Cholelithiasis
- Cholangitis
- Hepatitis
- Diverticulitis
- Colitis

**RIF**
- Appendicitis
- Colitis
- IBD / IBS

**NON SURGICAL CAUSES**
- ObGyn
  - PID, Ovarian cyst rupture, Mittleschmerz
- Urology
  - Renal stone, PEN, Cystitis
- Refered pain
  - AMI, pneumonia
- Others
  - AGE, Pancreatitis, Mesenteric adenitis, Crohn’s disease, porphyria, DKA

**History Taking**
- Onset / frequency / duration
- Location / Radiation
- Intensity / Severity
- Character / Pattern
- Associated symptoms
- Relieving / Aggravating factors

**Physical examination**
- General appearance and vital signs
  - Peritonitis – Pt lie very still
  - Renal colic – Pt toss around
- Fever (suggests infection / immunocompromise)
- Tachycardia / Orthostatic hypotension (suggests hypovolemia)
• Rectal examination – fecal impaction, palpable mass, occult blood in stool

**Important signs**

• Peritoneal signs  
  – Involuntary guarding, rebound / percussion tenderness
• Rovsing sign  
  – Palpation of LIF → pain in RIF
• Obturator / Psoas Sign  
  – Internal rotation of a flexed thigh / thigh extension
• Kehr’s Sign  
  – Palpation of LUQ → Left shoulder pain
• Carnett’s Sign  
  – Increased pain when a supine pt tenses abd wall

**Urgent situations**

• Fever a/w :
• Protracted vomiting
• Syncope / Presyncope
• GIT blood loss

**Pre-op Care**

• Get consent from patient
• Assess cardiorespiratory system
• PMHx
• Exercise tolerance / existing illnesses
• Allergies
• Intubation risks
• Pregnancy
• Complications of prev. anaesthesia
• Family Hx
• Cardiac risk  
  • Ejection Fraction
  • Goldman’s index of cardiac risk
• JVP distension
• Recent MI
• Severe progressive angina
• Pulmonary risk  
  • Smoking
• Hepatic risk  
  • Bilirubin
  • Serum albumin
  • Prothrombin time
  • Encephalopathy
• Nutritional risk  
  • Severe nutritional depletion  
    • > 20% BW
    • Serum albumin <3  
    • Serum transferrin <200mg/dL
• Metabolic risk  
  • Diabetic coma
• Fasting – NBO >2hrs before op
• Bowel / Skin preparation
• Prophylactic antibiotics

**Laboratory Tests**

• CBC
• Amylase and Lipase levels
• LFT
• UA
• Urine B-hCG
• Chlamydia & Gonorrhea
• Crossmatching
• Ca-markers
• Coagulation profile
• TFT

**Imaging**

• RUQ → US
• LUQ → CT
• RIF → CT with contrast IV media
• LIF → CT with oral and IV contrast
• Suprapubic → US
• DVT prophylaxis
• Pre-medications, Book / Order X-ray or HPE
• Catheterize / RT insertion
• Wrist identification tag
• Transport patient with documents, X-rays and full notes

**Post-op Care**

- Dull abd pain
- Nausea
- Pain around the shoulders
- Fever
- Tachycardia
- Severe pain in operation site

**Laboratory**

- FBC
- LFT
- Amylase
- US
- ERCP

- Relaparotomy
- Constipation
  - Bowel movements back to normal 10 – 14 days post laparotomy
- Orogastric Tube
- PO fluids – 6 hrs post-op
- Oral feeding – 12 - 24 hrs post-op
- Remove urinary catheter before regaining consciousness (Warn Post-op cystitis)
- Drainage of abdomen – 12 -24 hrs post-op
- Analgesia
  - Simple analgesic agents
    - Aspirin
    - PCM
    - Combination with omeprazole / misoprostol

**Abdominal Pain**

- ? Infection – persist 2-3 days
- ? Hematoma
- Abx

**Nausea**

- Antiemetic – Ondansetron
- Settles w/in 24 hrs
- Made worse with opiates

**Shoulder pain**

- Warn pre-op
- Worst in 24 hrs post-op
- Settles in 2-3 days
- PCM

**Fever**

- Day 1 – Atelectasis
- Day 3 – Pneumonia / UTI
- Day 5 – Deep thrombophlebitis
- Day 7 – Wound infection / Pulmonary Embolus
- Day 10-15 – Deep abscess

**Pain “Stepladder”**

- First Rung :
  - Simple analgesics
    - Aspirin, PCM, NSAIDs, Tricyclic drugs, Anticonvulsants
- Second Rung :
  - Intermediate strength opioids
    - Codeine, Tramadol, Dextropropoxyphene
- Third Rung :
  - Strong opioids
    - Morphine / PCAM, Pethidine

**Appendicitis**

- D/t – Fecolith
  - Stricture
  - Obstruction
Obstruction → Continued mucous secretion → Inflammatory reaction → Increase Intraluminal Pressure → Obstruction of lymph drainage

**Clinical Manifestation**
- Poorly localized colicky abdominal pain
- Periumbilical → RIF
- A/w – Anorexia / Nausea / Vomiting with pain / Discomfort which settles spontaneously
- Coughing / Sudden movement exacerbates pain
- First 6 hrs – Slight pyrexia (37.2 – 37.7)
  - Increase pulse 80-90

**Appendicitis – Signs**
- Localized abdominal tenderness
- Muscle guarding
- Rebound tenderness
- Limitation of respiratory movement in lower abd.
- Pointing sign
- Rovsing sign
- Psoas Sign
- Obturator sign
- Cutaneous hyperesthesia in RIF

**Peritonitis**
- Bacteria
  - E.coli, Bacteroides, Chlamydia, Gonococcus, GBS, Pneumococcus, Mycobacterium
- Mortality factors:
  - Degree and duration of peritoneal contamination
  - Age of patient
  - General health of patient
  - Nature of underlying cause

**Localized Peritonitis**
- Fever, tachycardia, Abdominal tenderness
- A/w vomiting, guarding, rebound tenderness, phrenic pain
- Silent Peritonitis

**Generalized Peritonitis**
- Early
  - Abdominal pain worsens when moving / breathing
  - Vomiting
  - Pt lies still
  - Tenderness and rigidity
  - Tender rectal / vaginal examination
  - Infrequent bowel sounds
  - Progressive increase of Pulse rate
  - Temperature may be subnormal
- Late
  - Abdomen silent
  - Distension
  - Circulatory failure
  - Cold clammy skin, sunken eyes, dry tongue, thready pulse
  - Hippocrates facies
  - LOC

**Appendicitis – Variants**
- Retrocecal
- Pelvic
- Post ileal
- Subhepatic

**Diagnostics**
- CBC
- Peritoneal Lavage
- AXR
- US / CT

**Treatment**
- General Care
- Specific treatment
- Peritoneal Lavage

**General Care**
- Correction of circulating volume
- CVP
- TPN
- GI decompression
- Abx therapy
- I/O chart
- Analgesia
- Vital Signs
Pancreatitis

Causes
- I – Idiopathic
- G – Gallstone
- E – Ethanol
- T – Trauma
- S – Steroids
- M – Mumps
- A – Autoimmune
- S – Scorpion Sting
- H – Hypercalcemia
- E – ERCP
- D – Drugs (Steroids, Sulfonamides, Azathioprine, NSAIDs, Diuretics)

Clinical Diagnosis – Signs
- Severe epigastric pain radiating to back
- N / V / D / LOA
- Fever / Chills
- Shock
- Grey-Turner – flank discoloration
- Cullen – umbilical discoloration

Treatment
- Pain Control
  - Morphine / Meperidine
- Bowel Rest
  - NBO / IV Fluids
- Nutritional Support
  - TPN / Post pyloric enteral feeding
- Antibiotics
  - Carbapenem 0.5mg IV every 8 hrly

Surgery
- Indication :
  - Pancreatic Necrosis
  - Diagnostic uncertainty
  - Complications
  - Gas bubbles on CT
- Positive bacterial culture on FNA

Laboratory Tests
- Serum Amylase
- Serum Lipase
- FBC
- Renal Profile
- LFT
- Serum Calcium
- ABG
- CXR / AXR / CT / MRI

Ranson Criteria
- At Admission :
  - Age >55 y.o
  - WBC > 16000 cells/mm3
  - Blood Glucose > 11mmol/l
  - Serum AST > 250 IU/l
  - Serum LDH > 350 IU/l
- At 48 hrs
  - Calcium < 2.0 mmol/l
  - Hcrit fall >10%
  - PaO2 < 6 mmHg
  - BUN > 1.8mmol/l
  - Base Deficit > 4 mEq/l
  - Sequestration of fluids > 6L

Urinanalysis
- Glucose , Ketones → DKA
- Microscopic hematuria → Urolithiasis
- Pyuria → Cystitis

Abdominal X-Rays
- Free intraperitoneal air
  - Upright AXR / CXR, standing position, left lateral decubitus
- Air fluid levels
  - Standing AXR, lateral decubitus
- Level of obstruction in ileus
  - Supine abdomen, KUB
**GI BLEEDING**

**INTRODUCTION**

- The many causes of gastrointestinal (GI) bleeding are classified into upper or lower, depending on their location in the GI tract.

Upper GI bleeding originates from:
- esophagus
- stomach
- duodenum.

* Ligament of Treitz is the border dividing the upper & lower GI tract.
  - Lower GI bleeding originates from:
    - jejunum & ileum
    - large intestine
    - rectum
    - anus

**STATISTIC IN MALAYSIA**

- Incidence rate about 72/100,000
- Mortality is about 10% on average
- Mortality comes with few risk factors:
  - senile patient (>80 y.o)
  - comorbidity (presence of other systemic disease)
  - presence of shock
  - endoscopic findings of active bleeding.

**UPPER GI BLEEDING**

**Main causes of upper GI bleeding in Malaysia**

- As a complication of peptic ulcer (predominantly duodenal ulcer). Causing about 65% causes of upper GI bleeding.
- Oesophageal varices bleeding account for 6.4% of UGIB.
- Other causes: Mucosal erosive disease

**Malignancies**

**Micellaneous** (mallory weiss tear, Dieulafoy lesion, polypoid lesion)

**SYMPTOM OF GI BLEEDING**

- Acute GI bleeding:
  - Blood vomiting (can be fresh / coffee ground)
  - Malaena/black tarry stool
  - Hematochezia
  - Fatigue
  - Weakness
  - Shortness of breath
  - Abdominal pain
  - Pale appearance.
• Chronic GI bleeding
  - Anemia
  - Black stools
  - Positive test for microscopic blood

**MANAGEMENT**

• History taking (to exclude history of stomach ulcers, intake of NSAID, Steroidal drugs, Hepatitis B/C, Renal insufficiency.)

• Observes the symptoms of shock (clammy sweat, tachycardia >100/m, postural hypotension, systemic BP <100mm/Hg, urine output <30ml/h)

• Observes any signs of chronic liver disease, e.g spider nervi, caput medusa, or altered mental state due to hepatic encephalopathy. (Presence of these symptoms increase the chance of esophageal varices).

• If signs of shock is not present, Insert 2 big bore cannula

• Saline solution infusion, monitor vital signs (Pulse, BP, Urine output)

• Draw blood for CBC, LFT, Glucose level

• Blood transfusion is necessary if:
  - systolic BP <110mm/Hg even after colloid infusion.
  - persistent tachycardia >110/min
  - significant postural hypotension
  - presence of concomitant IHD with Hb<10g/dl

* The use of whole blood is prohibited with the exceptional of shock.
* only Packed cells can be used.

**16 GAUGE**

• If shock, 1st, High flow of Oxygen, 2nd rapid IV colloid infusion up to 1 L.

• Set up CVP line, Aim for >5cm H2O (especially in older patient even if shock is not present).

• Catheterization and urine monitor (aim for >30ml /H).

• Monitor vital signs every 15 mins.

If active bleeding still present, call surgeon

**Specific treatment**

• For peptic ulcer, 15ml of Adrenaline (1:10,000) inject into the active bleeding ulcer under the control of gastroscope.

• Sclerosing therapy can be used e.g Ethanolamine but not as frequent.

• Other endoscopic treatment like thermal method Argon plasma coagulation, heater probe.

High dose of PPI must be given after endoscopic therapy.

• In case of esophageal varices, endoscopic therapy is always effective. (sclerotherapy by using ethanol, polidocanol.)

• Endoscopic ligation and banding of varices is equally effective.

• With the combination of Terlipressin (2mg IV bolus then, 1-2 mg 4-6 hourly until bleeding controlled in 24-48hr).

• Somatostatin infusion at 250microgram/hr, then same dose IV for 5 days.

• Octreotide bolus dose 50 microgram followed by IV 25microgram for 5 days.

**SENGSTAKEN-BLACKMORE TUBE**

**After care**

• Patient with high risk of rebleeding (old age, comorbidities, large ulcer>2cm, posterior DU, active bleeding during endoscopy, Hb<10g/dL, high urea level) must be monitored in ICU.
• Rebleeding in peptic ulcer, surgical intervention is necessary. (embolization using Gelfoam)
• Recurrent variceal bleeding, TIPS is used.

**LOWER GI BLEEDING**

- Most common causes:
  - Diverticulosis
  - Haemorrhoids
  - Anal fissure
  - Crohn’s disease
  - Colonic polyps
  
  Malignancies
  - In *Diverticulosis*, *antibiotic therapy is important to prevent intestine infection (E.g. Cephalosporin and Metronidazole)*
  - In *Haemorrhoid*, ligation or banding is necessary in the 3rd or 4th stage.
  - In *Crohn’s disease*, usage of corticosteroids or cytostatic drugs can be used.
  - In malignancies, refer to oncologist.
BURN

- A burn is damage to the skin’s tissues caused by excessive heat

Types of Burns

- Scalds - most common, they occur when skin comes into contact with hot liquids (hot oil, hot water)
- Thermal - smoking, improper use of flammable liquids, auto accidents or clothing ignited by stoves or space heaters.
- Contact - Many burns are caused by contact with hot objects such as metal, plastic, glass and hot coals.
- Chemical - The severity of this type of burn depends on the kind of chemical, length of exposure and amount of tissue involved.
- Electrical - Contact with live wires or unprotected electrical outlets. Severity depends on the intensity of the electrical current and the duration of exposure.
- Ultraviolet - Severe burns can result from overexposure to sun or tanning equipment.
- Inhalation Injury – Due to toxic gas or fumes from a fire or chemical leak.

Classification acc. to Depth

- First-degree burn
- Second-degree burn (partial thickness burns)
- Third-degree burn (full thickness burns)

Partial thickness burns

- painful
- pink or red
- develop blisters
- blanch when touched

Full thickness burns

- not painful (because the nerves have been destroyed)
- white, black, or grey
- skin becomes leathery
- does not blanch when touched

Estimating the Extent of a Burn
Palm Method
The surface of the *palm = 1% of the Body surface
*Patient’s palm

Burn Criteria

Minor
- $3^0 < 2\%$ BSA
- $2^0 < 15\%$ BSA
  - <10% pediatric
- $1^0 < 20\%$ BSA

Moderate
- $3^0$ 2-10% BSA
- $2^0$ 15-30% BSA
  - 10-20% pediatric
- Excluding hands, face, feet, or genitalia
- Without complicating factors

Critical
- $3^0 > 10\%$ BSA
- $2^0 > 30\%$ BSA
  - >20% pediatric
- Burns with respiratory injury
- Hands, face, feet, or genitalia
- Burns complicated by other trauma
- Underlying health problems
- Electrical and deep chemical burns

Management

I) History of a fire in a closed space or patients found unconscious at the scene
   - Cherry red skin, High COHB level
     - 100% O2

II) History of a fire in a closed space or patients found unconscious at the scene
   - Singed facial/nasal hairs
   - Horse voice
   - Facial burns
   - Oral burns
   - Sooty sputum
   - Laryngoscopy findings
     - Inhalation injuries
     - Perform intubation
IV fluids (burn >15% of the total body surface area (TBSA) hypovolemia)

Analgesics

NSAID

Application of topical antibiotic

Calculating iv infusion

*Parkland formula

Amount of crystalloids (ml) = 4 x % burn x body weight (kg)

- Ringer Lactate, Hartmann’s sol.
- Total volume of the first 24 hours
- One half of the calculated fluid requirement is administered in the first 8 hours
- Balance is given over the remaining 16 hours
- Volume of fluid given is based on the time elapsed since the burn.

Example:

A man who weighs 70 kg has a 30% BSA burn

4 x 30 x 70 kg = 8400 ml

- 4200 ml for the first 8 hours (525 ml/h)
- 4200 ml for the remaining 16 hours (262.5 ml/h)

The formula is a guide only and infusions must be tailored to:

- urine output (0.5-1 ml/kg/h)
- central venous pressure

Inadequate fluid resuscitation causes renal failure and death but over-hydration also causes morbidity and mortality.

Treat Burn Wound

- Low priority - After ABC's and initiation of IV's
- A debate exists as to whether intact blisters should be debrided (ruptured)
- Cover with sterile dressings
  - Moist: Controversial, limit to small areas (<10%) or limit time of application
  - Dry: Use for larger areas due to concern for hypothermia
  - Cover with burn sheet
- check tetanus status of all patients and to administer tetanus immunization (Td) as appropriate

Escharotomy

- when circumferential full-thickness burns involving the extremities or the chest are present
- as edema forms in the injured extremity following the burn, the eschar restricts outward expansion of the tissue as a result compromises vascular flow
- full-thickness burns are insensate so there is no need for the use of topical anesthetics
- bleeding is also minimal

Skin Graft

- involve taking skin from unburned sites on the body, referred to as donor sites, and grafting that skin onto the burn wound
- the grafted skin attaches to the underlying tissue and effectively closes the wound
**Fluid and electrolyte balance. Interpreting ABG.**

Perioperative fluid therapy:

- **Preoperative transfusion:** Average 2000ml (a volume of 35 – 40 ml/kg/ day)
- **Replacement for patients with normal homeostasis:**
  - Fluid requirement during starvation - 2 ml/kg/hour of starvation to be replaced over 2 – 3 hours.
  - Maintainance requirement – 2ml/kg/h of surgery
  - 3rd space losses – 4,6, 8 ml/kg/hour depending on severity of dissection
- **Blood loss during surgery:**
  - If hematocrit < 25% : replace with equal amounts of blood.
  - If hematocrit > 25% : replace with equal amount of colloid or 3Xcrystalloid.
- **Principles of transfusion during surgery:**
  - Fluid deficit due to starvation
  - Maintainance fluids
  - 3rd space losses
  - Blood loss
- **Special cases:**
  - In case of pt with CHF or RF, fluid status is monitored using CVP (N = 5 – 10 mm H2O).
  - A decreased CVP is indication to begin transfusion.
  - Regimen for RF pt: 500ml + previous day’s output.
  - Regimen for HF pt: ½ of normal volume (not more than 1.5L /24 hours)
- **Post operative transfusion:**
  - Follow exactly pre-op transfusion, increase regimen for these special cases:
    - 1) Dehydration (Losses > 5ml)
    - 2) Shock (All causes except cardiogenic)
    - 3) Operative losses
    - 4) Gut losses (NGT aspirate)
    - 5) Transpiration losses
    - 6) Losses from surgical drains
- **Signs of insufficient post op transfusion:**
  - Decreased urine output
  - Decreased CVP
- **Types of transfusion fluids:**
  - Crystalloids
  - Colloids
  - Special purpose solutions
- **Crystalloids:**
  - Isotonic solution of electrolyte in water, e.g NS 0.9%
  - Large volume replacement fluids, e.g. Ringer’s Lactate
  - Fluid for patients with risk of low sugar or high sodium, e.g D5W
- **Colloids:**
  - Solution with large molecules which tend to remain in intravascular component.
  - E.g gelatine, pentastarch, dextran 40, dextran 70
- **Special purpose solutions**
  - Sodium bicarbonate (7.5% or 8.4%) – used to treat met.acidosis, hyperkalaemia, forced alkaline diuresis.
    SE: Increased Na load, Increased ICP and intravascular hemorrhage in neonates, CF / Respiratory failure.
  - Mannitol (10% or 20%) – used to increase intravascular volume.
  - Hypertonic saline (1.6%, 3% or 5%) – used to treat hyponatremia.
  - Albumin – used as plasma expander.
- Electrolyte dysbalance

<table>
<thead>
<tr>
<th>Normal range</th>
<th>Causes of elevation</th>
<th>Causes of decline</th>
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<tbody>
<tr>
<td><strong>Sodium (Na):</strong></td>
<td><strong>Hypernatremia:</strong> Excessive loss of water through GI system, lungs, or skin; fluid restriction, certain diuretics, hypertonic IV solutions, tube feeding; hypothalamic lesions, hyperaldosteronism, corticosteroid use, Cushing’s syndrome, diabetes insipidus</td>
<td><strong>Hyponatremia:</strong> Congestive heart failure, cirrhosis, nephrosis, excess fluid intake, syndrome of inappropriate antidiuretic hormone secretion (dilutional hyponatremia); sodium depletion, loss of body fluids without replacement, diuretic therapy, laxatives, nasogastric suctioning, hypoaldosteronism, cerebral salt-wasting disease</td>
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<tr>
<td>135 – 145 mEq/L</td>
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<tr>
<td><strong>Potassium (K):</strong></td>
<td><strong>Hyperkalemia:</strong> Aldosterone deficiency, sodium depletion, acidosis, trauma, hemolysis of red blood cells, potassium-sparing diuretics</td>
<td><strong>Hypokalemia:</strong> Lack of dietary intake of potassium, vomiting, nasogastric suctioning, potassium-depleting diuretics, aldosteronism, salt-wasting kidney disease, major GI surgery, diuretic therapy with inadequate potassium replacement</td>
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<tr>
<td>3.5 – 5.0 mEq/L</td>
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<tr>
<td><strong>Calcium (Ca):</strong></td>
<td><strong>Hypercalcemia:</strong> Excessive vitamin D, immobility, hyperparathyroidism, potassium-sparing diuretics, ACE inhibitors, malignancy of bone or blood</td>
<td><strong>Hypocalcemia:</strong> Hypoparathyroidism, malabsorption, insufficient or inactivated vitamin D or inadequate intake of calcium, hypoalbuminemia, diuretic therapy, diarrhea, acute pancreatitis, bone cancer, gastric surgery</td>
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<tr>
<td>8.5 – 10.5 mg/dL</td>
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<td><strong>Magnesium (Mg):</strong></td>
<td><strong>Hypermagnesemia:</strong> Excessive use of magnesium-containing antacids and laxatives, untreated diabetic ketoacidosis, excessive magnesium infusions</td>
<td><strong>Hypomagnesemia:</strong> Malabsorption related to GI disease, excessive loss of GI fluids, acute alcoholism/cirrhosis, diuretic therapy, hyper- or hypothyroidism, pancreatitis, preeclampsia, nasogastric suctioning, fistula drainage</td>
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<tr>
<td>1.5 – 2.5 mg/dL</td>
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- Interpreting ABG results

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Check arterial pH

pH < 7.4 Acidosis
- PCO2 > 40 mmHg
  - Respiratory acidosis
    - Hypoventilation
      - Acute lung disease
      - Chronic lung disease
      - Opioids, narcotics, sedatives
    - Weakening of respiratory muscles
  - Metabolic acidosis with compensation
    - Renal failure
    - Lactic acidosis
    - Ketoacidosis (DM)
    - Aspirin ingestion
  - Anion gap
    - Renal failure
    - Lactic acidosis
    - Ketoacidosis (DM)
    - Aspirin ingestion
    - Normal anion gap (8–12 mEq/L)

pH > 7.4 Alkalosis
- PCO2 < 40 mmHg
  - Respiratory alkalosis
    - Hyperventilation
    - Aspirin ingestion (early)
  - Metabolic alkalosis with compensation
    - Vomiting
    - Diuretic use
    - Antacid use
    - Hyperaldosteronism
- PCO2 > 40 mmHg
  - Acidosis
  - Alkalosis
```

CSMU HOW SURGICAL TEAM
BLOOD TRANSFUSION

WHEN to use???

Red Blood Cell

1. To REPLACE acute and major blood loss
   - Haemorrhagic shock
   - Acute blood loss >25%
   - Major surgery – open heart surgery, gastrectomy
   - Extensive burns

2. Anemia due to chronic blood loss or disease

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Red cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute blood loss (&gt;20% of blood volume)</td>
<td>WHOLE BLOOD</td>
</tr>
<tr>
<td>Anemia of chronic causes</td>
<td>PACKED CELL</td>
</tr>
<tr>
<td>Fetal, neonatal</td>
<td>Leucocytes depleted red cells</td>
</tr>
<tr>
<td>Patients with IgA deficiency and IgA Ab</td>
<td>Washed red cells</td>
</tr>
<tr>
<td>Intraterine and neonatal exchange transfusion,</td>
<td>Irradiated red cells</td>
</tr>
<tr>
<td>recipient of allogenic stem cell transplant,</td>
<td></td>
</tr>
<tr>
<td>hodgkin’s disease</td>
<td></td>
</tr>
</tbody>
</table>

Decision based on patient’s condition!!!!!
Do not rely on lab finding!!!!

Platelet
- Decrease production - Acute and chronic leukaemias, Aplastic anaemia
- Increase destruction - Consumptive coagulopathies e.g. DIC
- Functions abnormalities - Aspirin and NSAIDs
- Dilutional - Massive blood transfusion—in practice not usually required unless some other haemostatic abnormality (e.g. consumption)
- Cardiac bypass

Fresh Frozen Plasma
- DIC massive transfusion
- Surgery where pt has severe liver failure
- Pt with coagulopathy and bleeding

Cryoprecipitate
- Fibrinogen replacement eg DIC, congenital dysfibrinogenaemia, advanced liver disease, congenital factor XIII deficiency
- Promote haemostasis eg chr renal failure, congenital plt dysfx, massive transfusion
HOW to use????

Red Blood Cell
WB – 1 unit run fast < 1 hour
PC – 1 unit run over 4-5 hours
  • Cross match before giving to patient
  • Check the pack, make sure the right blood to the right patient!!!!

Expected outcome
  • 1 Unit of WB or PC = increase HCT by 3%
  • Dose of PC depends on Hb level,
  • Try to keep Hb > 8 g/dl,
  • Unless pt has poor cardiopulmonary or cerebrovascular reserve
  • Iv frusemide 20mg for pt with cardiac disorder, to prevent circulatory overload

Platlets

<table>
<thead>
<tr>
<th></th>
<th>Derived from routine blood donation</th>
<th>Derived from single donor apheresis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>40-60 ml/unit</td>
<td>+- 300ml</td>
</tr>
<tr>
<td>Plt count</td>
<td>&gt;55 x 10^9/unit</td>
<td>&gt; 240 x 10^9/unit</td>
</tr>
<tr>
<td>Dose and rate</td>
<td>1 unit per 10kg (usually 4-6 unit)</td>
<td>1 unit</td>
</tr>
<tr>
<td>Expected increment per unit transfused</td>
<td>5-7 x 10^9/l</td>
<td>30-50 x 10^9/l</td>
</tr>
</tbody>
</table>

Fresh Frozen Plasma
  • Dose is determined by clinical situation and underlying disease
  • 12-15ml/kg body weight over 1-2 hour
  • followed by coagulation profile to determine responsiveness and guide further tx

Expectations
  • 1 unit (150-300ml) = increment of each clotting factor activity by 3%

Cryoprecipitate
  • 10 bags - increment of 75mg/dl in a 70kg adult
  • Efficacy is dose dependent
  • So increase dose and repeat tx maybe needed if initial treatment fails.
  • Should be infused within 6 hour of thawing

Preoperative
1. manage Hb level
  • Correct anemic state
  • Eg ferritin 200mg tds, keep ferum level >30mmol/l
2. manage hemostasis
  • plt > 50 x10^9/l – most surgical procedures
  • Plt > 60 x10^9/l – liver biopsy
  • Plt > 100 x10^9/l – brain, eye surgeries
**Intraoperative**
- Leave it to surgeon
- Principlely Hb level should be maintained at 70-90g/l in young, not heart diseased pt
- 90-100g/l in older, heart diseased pt

**Postoperative**
- 1 week – increase reticulocytes in bone marrow healthy pt
- 1 month – should restore 60% of surgical blood loss
- Iron can be given from 7th day post op, for 3-4 weeks if Hb loss was high in surgery or low in preop period

**Blood Ordering**
- **Patient ID:** name, DOB, i/c #, ethnic, age, sex
- blood group (if known)
- Hb %
- Diagnosis
- Reason to transfuse
- Previous transfusions? Any reaction?
- How many units? Of what?
- When? Time?
- Send 5cc of blood to the lab for GXM

**Consent**
- *description* of the **recommended treatment** - Blood Transfusion
- **Risks:** possible risk
  - s involved with this blood transfusion including, but not limited to, transfusion of infectious hepatitis, acquired immune deficiency syndrome (AIDS), or certain other diseases, unexpected *transfusion reactions*, such as immunization or allergic reactions.
- **Alternatives treatment** to blood transfusion and/or blood products,
- risks and consequences of **not receiving** this therapy

**NB**
- Never forget to match the identity of blood pack with patient.
- Always involve the patient by asking them to state their name, DOB where possible
- Make sure the right blood to the right patient
Tranfusion complications

Complications

Infectious
1) Bacterial
2) Viral
3) Parasite

Non-Infectious

Immediate
1) Immune mediated haemolytic reaction
2) Non-immune haemolysis
3) Febrile non-haemolytic transfusion reaction
4) Acute respiratory distress
5) Allergic reaction
6) Metabolic complications
7) Circulatory overload
8) Air embolism
9) Coagulation abnormalities

Delayed
1) Alloimmunization
2) Delayed haemolytic reaction
3) Post-transfusion purpura
4) Transfusion-associated Graft vs Host Disease
5) Iron overload

Clinical features

- Nausea, vomiting
- Headache
- Restlessness, agitation
- Fever, rigor, chills
- Flushing, urticaria
- Back pain, chest pain, flank pain, abd pain, pain at site of venepuncture
- Shortness of breath
- Hypotension
- Jaundice
- Bleeding
Signs and symptoms

1) Acute Haemolysis Management
   - Stop blood transfusion
   - Correct hypotension, control bleeding, prevent acute tubular necrosis
   - Maintain urine output >1.5ml/kg/h by forced diuresis
   - Sodium bicarbonate to increase urine pH to facilitate excretion of free haemoglobin
   - Repeat blood biochem every 6-8h till stable

2) Infection Management
   - Stop blood transfusion
   - Correct hypotension, control bleeding, prevent acute tubular necrosis
   - Maintain urine output >1.5ml/kg/h by forced diuresis
   - Sodium bicarbonate to increase urine pH to facilitate excretion of free haemoglobin
   - Repeat blood biochem every 6-8h till stable
   - Send blood for C&S
   - Use appropriate antibiotics

3) Febrile Non-haemolytic Management
   - Slowing transfusion
   - Give PO antipyretics, antihistamines or steroids
4) Allergic Management
   • Temporary stopping transfusion
   • Give IV antihistamine
   • Resume transfusion after 15-20 minutes

5) Anaphylactic Management
   • Stop transfusion
   • IM adrenalin, IV hydrocortisone, IV antihistamine, IV fluid, AVL
   • Should be given washed red cells instead
**LIMB ISCHEMIA**

**Causes:**
1. Acute thrombosis
2. Emboli

<table>
<thead>
<tr>
<th>Acute thrombosis</th>
<th>Emboli</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Due to pre-existing Atherosclerosis</td>
<td>• Due to MI, AF,</td>
</tr>
<tr>
<td>Features:</td>
<td>• ventricular aneurysms</td>
</tr>
<tr>
<td>• Hx of intermittent claudication</td>
<td>• No Hx of int. claudication</td>
</tr>
<tr>
<td>• Slow onset</td>
<td>• Rapid onset and complete occlusion</td>
</tr>
<tr>
<td>• No obvious source of emboli</td>
<td>• Cardiac dysrhythmias</td>
</tr>
</tbody>
</table>

**Etiology:**
Special causes-
Upper extremity aneurysms
Radiation arteritis
Thoracic outlet syndrome
Fibromuscular dysplasia
Arteritis- Takayasu
  - Giant Cell

**History (Hx)**
- Pain
- History of previous episodes
- Claudication / Exertional fatigue
- Cardiac disease
- Recent trauma
- HTN, back pain or chest pain.
- Drugs
- Low flow states

**Examination**
- 5 Ps
- Trophic changes, nail changes
- Complete bilateral pulse exams
- Assessment of limb viability
- Cardiac examination
- EKG

**Symptoms n signs:**
**5PS:** (Pain  Palor  Pulselessness  Paraesthesia  Perishingly cold)
Diagnostics
- Radiology
  - noninvasive
    - CXR
    - Abdominal x-ray
    - Doppler velocity flow detection
    - Duplex ultrasonography
- Radiology
- Invasive
  - Angiography
  - Indications
  - Determine site of the vascular obstruction
  - Suspect thrombosis
  - Suspect aortic dissection
  - Suspect multiple emboli
  - MRA / MRV

Emergency Management
Resuscitation
1. Give 100% oxygen
2. Get iv access and give crystalloid fluid up to 1000ml if dehydrated
3. Take blood for FBC, troponin, clotting, glucose, group and save
4. Request CXR and ECG (check for dysrhythmias)
5. Give opiate analgesia (5-10 mg morphine)
6. Call for senior help

Establish a diagnosis:
- Patients will often have coexisting coronary, cerebral or renal diseases
- Type (embolism/thrombosis). Thorough hx and examination is essential.
- Limb viability assessment:
  - Irreversible: fixed mottling of skin, petechial haemorrhages in skin, woody hard muscle.

Complete: white, cold and pulseless limb.

Incomplete: Reduced pulses, reduced capillary refill

Early treatment:
- Consider heparin (5000 u unfractioned heparin iv bolus and start an infusion of 1000 u per hour) if there are no contraindications.

Definitive Management:
Depends on severity of ischemia
1. Irreversible (non-salvageable limb)
   - Amputation is inevitable and urgency needed to prevent systemic complications of muscle necrosis (hyperkaelemia, acidosis, acute renal failure and cardiac arrest)

2. Complete (acutely threatened limb)
   - Requires expert vascular input: thrombolysis, angioplasty, embolectomy, or urgent arterial bypass maybe required.
3. *Incomplete* (viable limb)

   Need heparinization to prevent further propagation of thrombus, urgent imaging, and consideration of intervention (thrombolysis, angioplasty, and arterial surgery)

**Chronic Lower limb ischemia**

1. Atherosclerosis is a generalized disease and has a predilection for the coronary, cerebral and peripheral circulations.
2. It may affect the aorto-iliac, femoral or popliteal and even calf vessels singly or in combinations.
3. Single level disease usually results in intermittent claudications critical limb ischemia.

**Intermittent claudication**

Risk factors:

- Hypertension
- Hyperlipidemia
- Diabetes Mellitus
- Tobacco smoking
- Obesity
- Diet
- Sedentary life style

**Clinical features**

A history of muscular, cramp like pain on walking that is rapidly relieved by resting, together with absent pulses, strongly supports the diagnosis of intermittent claudication.

Disease of the superficial femoral artery in the thigh results in absent popliteal and foot pulses and often causes calf claudication.

*Method of palpating the femoral pulse in the skin crease of groin.*

Counterpressure on the lower abdomen pushes the skin crease toward the inguinal ligament and reduces the risk of missing the pulse.

*Method of palpating dorsalis pedis (A) and posterior tibial.*

Examine pulses from the foot of the bed, keeping the fingers flat for the dorsalis pedis and using the fingertips for the posterior tibial while applying counter pressure with the thumb.

*Method of palpating dorsalis pedis (B) pulses.*

Examine pulses from the foot of the bed, keeping the fingers flat for the dorsalis pedis and using the fingertips for the posterior tibial while applying counter pressure with the thumb.

**Differential Diagnosis**

- The pain of nerve root compression can be mistaken for vascular claudication. A careful history can usually distinguish nerve root compression, especially sciatica due to compression of the lumbosacral root.
Algorithm of treatment of IC

Conservative treatment
- All patients with peripheral vascular disease benefit from taking aspirin (75 to 300 mg/day) because this reduces the risk of cardio-vascular events
- Patients who are intolerant of aspirin should take dipyridamole (200 mg twice daily) or clopidrogrel bisulfate (75 mg/day).

Exercise Programs
- A recent meta-analysis of 21 supervised exercise programs showed that training for at least 6 months, by walking to near-maximum pain tolerance, significantly improved pain free and maximum walking distance

Endovascular Techniques
- Endovascular techniques have virtually replaced conventional surgery. Percutaneous transluminal angioplasty seems best suited for stenoses or short occlusions of the iliac and superficial femoral vessels, with 1-year patency rates of 90% and 80% respectively.
What is a varicose vein?

- Long, **tortuous** and **dilated** veins of the superficial varicose system
- Commonly legs but where else?
- Abdominal Wall
- Anus
- Vulva
- Oesophagus

Why do they happen?

- increased pressure in the **superficial** venous system
- normally blood flows from superficial system to deep
- if the valves protecting the superficial veins become incompetent there is higher pressure in the superficial veins and they become varicose

Causes

Primary

- Congenital abnormality, most common cause

Secondary

- Anything that raises intra-abdominal pressure or raises pressure in superficial/deep venous system
  - so…:
    - Pregnancy
    - Abdominal/pelvic mass
    - Ascites
    - obesity
    - constipation
    - thrombosis of leg veins

Cheeky bit of anatomy

- Superficial System arises from foot and ends at Sapheno-femoral junction or Sapheno-popliteal junction
- Long saphenous vein - medial leg up to SFJ
- Short saphenous vein - lateral malleolus round back of ankle, up calf to meet popliteal vein behind knee
- Sapheno- femoral junction - 4 cm lateral and 4cm below the pubic tubercle

Symptoms

- Aching, burning, throbbing, stabbing leg pain
- tired/heavy legs worse as day progresses and long periods of standing
- skin changes-hair loss, itching, eczema etc
- Swellings (peripheral edema)
- Restless legs
- Numbness
- Cramping

CEAP classification

- “C” = Clinical
- “E” = Etiology (primary vs. secondary)
- “A” = Anatomy (defines location of disease within superficial, deep and perforating venous systems)
- “P” = Pathophysiology (reflux, obstruction, or both)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C0</td>
<td>no visible venous disease</td>
</tr>
<tr>
<td>C1</td>
<td>telangiectasias or reticular veins</td>
</tr>
<tr>
<td>C2</td>
<td>varicose veins</td>
</tr>
<tr>
<td>C3</td>
<td>edema</td>
</tr>
<tr>
<td>C4</td>
<td>skin changes without ulceration</td>
</tr>
<tr>
<td>C5</td>
<td>skin changes with healed ulceration</td>
</tr>
<tr>
<td>C6</td>
<td>skin changes with active ulceration</td>
</tr>
</tbody>
</table>
**CEAP Class 1**
Superficial spider veins (reticular veins) only.

**CEAP Class 2**
Simple varicose veins only

**CEAP Class 3**
Ankle edema (due to venous disease). The venous congestion, often due to saphenous vein incompetence, may lead to dependent edema. Elimination of the venous reflux often gives dramatic results.

**CEAP Class 4**
Skin pigmentation in the gaiter area (e.g. lipodermatosclerosis, medical calf fibrosis). The hemosiderin deposition in the medical subcutaneous leg causes the pigmentation changes and can also lead to mild chronic inflammation leading to fibrosis.

**CEAP Class 5**
A healed venous ulcer. Elevated venous pressures may lead to relative tissue hypoxia, which causes skin fragility and ulceration. Restoration of normal venous hemodynamics leads to ulcer healing

**CEAP Class 6**
An open venous ulcer. Venous hypertension changed the perfusion gradients which let to this ulcer. Once the refluxing saphenous vein was ablated and venous flow normalized, the ulcer began to heal quickly.

**So the examination**
- Inspection
- Palpation
  - cough test
  - tap test
- Ausculation
- Tourniquet Tests
  - Trendelenberg
  - Tourniquet test
  - Perthes
- Doppler
  - Sapheno-femoral junction
  - Sapheno-popliteal junction

**Inspection**
- Start with patient standing-both legs exposed to the groin
- ‘Look along the distribution of the Long saphenous vein’ Medial side,and length of the leg
- ‘Next look along the distribution of the Short Saphenous vein’ Below knee, posterior and lateral aspects of leg
- Remember!! when describing veins they arise at the bottom of the leg and go upwards to the groin!

**Inspection- other features**
1. Venous Stars- blueish vessels that distend above the skin surface
2. Thrombophlebitis- superficial red painful lump
3. Brown pigmentation- haemosiderin deposition
4. Venous Eczema
5. Venous Ulcers- over medial ankle or ‘gaiter area’
6. Lipodermatosclerosis-progressive sclerosis of cutaneous fat- ankle becomes thin and hard- area above becomes oedematous
7. Scars from previous surgery
Palpation

- Palpate the veins to confirm they are intact veins- will refill if if gently pressed and released
- Next- find the sapheno-femoral junction (SFJ)
  - Find Pubic Tubercle just lateral to pubic symphisis
  - 4 cm lateral then 4cm below
  - Palpate for a **sapheno varix**- localised distension of the long saphenous vein in the groin
- **Cough Test**- Fingers over SFJ, ask patient to cough can you feel a thrill, if yes suggest incompetence
- **Tap Test**- tap over the SFJ and feel further down long saphenous vein for any transmitted sounds, if yes suggest incompetence

Ausculation

- Auscultate over any varicosites for bruits
- due to A-V malformation

Trendelenberg/Tourniquet tests

Aim- to localise the valve/s that are incompetent

Trendelenberg

- Lie patient down and raise leg attempting to drain varicosities of blood.
- Using either a tourniquet or fingers put pressure over SFJ to occlude it
- Ask patient to stand

If varicosities **DO NOT** refill indicates SFJ incompetence

If **DO** refill the leaky valve is lower down

‘Now we try and locate the incompetent perforator using the tourniquet test’

**Tourniquet test continued**

- Same as before- lie down, raise and drain leg
- Place tourniquet approximately over area of each perforator( mid thigh, sapheno popliteal, calf perforators)
- If varicosities **DO NOT** refill that perforator is incompetent
- If varicosities **DO** refill continue further downwards of leg

Perthes test

Now we check the patency of the deep venous system’

- Ask patient to stand up
- tourniquet round mid thigh
- raised onto toes 10 times ( pumps blood up leg)
- if veins **empty**- deep system fine
- if veins **swell** and become **painful**- ? deep vessel occlusion

Doppler!

- Has taken over from tourniquet test as gold standard
- ‘We use a Doppler to check for incompetence at the Sapheno femoral junction and Sapheno popliteal junction’
- Find SFJ
- Place doppler over it
- Squeeze either thigh of calf
- One whoosh as blood goes up – good
- second whoosh if blood comes back down bad! means SFJ is incompetent, the quicker the second whoosh the more incompetent the valve
- **Remember one whoosh good two whoosh bad!**
- Exactly the same in Sapheno- popliteal junction in popliteal fossa
Differential Diagnosis
Primary varicose veins should be differentiated from secondary varicose veins to exclude:

- the possibility of chronic venous insufficiency of the deep system of veins
- obstruction of the pelvic veins,
- arteriovenous fistula (congenital or acquired), or congenital venous malformation.
- If extensive varicose veins are encountered in a young patient - especially if unilateral and in an atypical distribution (lateral leg) - Klippel-Trenaunay syndrome must be considered.
- Classic triad of Klippel-Trenaunay syndrome:
  - varicose veins
  - limb hypertrophy
  - cutaneous birthmark (port wine stain or venous malformation)

- Pain or discomfort secondary to arthritis, radiculopathy, or arterial insufficiency should be distinguished from symptoms associated with coexistent varicose veins.

Management

- Management options:
  - Conservative - reassurance, exercise, avoid long stands, weight reduction, elevation of legs, compression stockings
  - Surgical - injection sclerotherapy, ligation of SFJ (trendelenberg procedure), Stripping of tributaries, isolated removal of small varicosities
PNEUMOTHORAX

The presence of air between the two layers of pleura, resulting in partial or complete collapse of the lung.

Types

- Primary spontaneous pneumothorax
- Secondary spontaneous pneumothorax
- Tension pneumothorax
- Traumatic pneumothorax

Primary spontaneous pneumothorax

- Occurs without any apparent cause in people without a known lung disorder.
- Occurs when a small weakened area of lung (bulla) ruptures due to lung tissue weakness.
- Most common in tall young man. (Marfan Syndrome)
- May occur while smoking. (esp: marijuana)
- Changes in air pressure. (scuba diving, mountain climbing)

Secondary spontaneous pneumothorax

- Occur in people with lung disorder (eg: COPD, pneumonia, TB, cystic fibrosis, cancer).
- More severe.

Tension pneumothorax

- Associated with the formation of a one-way valve at the point of a rupture in the lung.
- Air becomes trapped in the pleural cavity between the chest wall and the lung.
- Builds up, putting pressure on the lung and keeping it from inflating fully.

Traumatic pneumothorax

- Also called as ‘opened’ type
- May occur after an injury
- Medical procedure that introduces air into the pleural space, such as thoracentesis, bronchoscopy, or thoracoscopy.
- Ventilators can cause pressure damage to the lungs (barotrauma)

Symptoms

- Sudden shortness of breath
- Pain felt in the chest, back and/or arms
- Dry coughs
- Cyanosis (turning blue)
- Sound of air flowing through the puncture hole ("sucking" chest wound)
- Tachycardia

Tension pneumothorax - signs of cardiovascular collapse and shock will occur. (N.B. LIFE THREATENING!!!)

Diagnosis

- **AUSCULTATION** -> decreased or no breath sounds on the affected side.
- **PERCUSSION** -> Hyperresonance.
- **ARTERIAL BLOOD GAS** - to check the oxygen level in the blood.
- **CHEST X-RAY**
  - Shows the air pocket and the collapsed lung outlined by the thin inner pleural layer.
  - Show if the trachea is being pushed to one side.
  - Deep sulcus sign

### Treatment

#### OPEN PNEUMOTHORAX
- Start by uncovering the wound.
- If the clothing is stuck to the wound or in a chemical environment, then clothing should not be removed.
- Prepare an occlusive patch.
- The patch should be large enough to extend 2 inches beyond the edge of the wound.
- Smaller patches tend to get pulled back into the wound.
- Secure the patch to the wound with adhesive tape.
- Three sides should be taped, while the 4th side is left untaped.
- Exhalation - air is expelled from the chest cavity and escapes from underneath the open edge of the patch.
- Inhalation - the patch sticks to the skin and keeps air from returning into the chest cavity. This helps to re-inflate the collapsed lung

#### NON TENSION PNEUMOTHORAX
- Placing a chest tube and admission to the hospital
- If small, and not expanding, a small catheter can be placed in the chest and the air removed via suction techniques with a syringe.

#### TENSION PNEUMOTHORAX
- Emergency removal of air under pressure, by inserting a needle attached to a syringe into the chest cavity.
- Second (2nd) intercostal space midclavicular line, or the fifth (5th) intercostal space mid-axillary line
- Placing a plastic tube ("chest tube") within the chest cavity, through a small incision near the armpit, under suction and water seal.
INGUINAL HERNIA

- An inguinal hernia occurs in the groin area, when an organ, usually a part of the intestine, protrudes through the abdominal wall into the inguinal canal.

Types:

Indirect

- entrance of the inguinal canal at the inguinal ring does not close, leaving a weakness in the abdominal wall (congenital hernias in young)
- Passes lateral fossa
- Enters internal (deep) inguinal ring

Direct

- caused by connective tissue degeneration which causes weakening of the muscles during the adult years
- Passes medial fossa
- Enters Hesselbach triangle & covered by transverse fascia

Hesselbach triangle

- medially-Rectus abd.
- laterally-Inf. epigastric vessel
- inferiorly-Inguinal lig.

Causes of hernia

- Straining during bowel movements or urination
- Heavy lifting
- Fluid in the abdomen (ascites)
- Pregnancy
- Excess weight
- Chronic cough
- Congenital causes(prematurity)

History

- How long have you noticed the discomfort (swelling, mass, pain)?
- Does standing or activity such as lifting intensify or evoke the pain?
- Does coughing or sneezing make the lump more prominent?
- Will lying down relieve the symptoms or allow the swelling to disappear? -> Direct Inguinal Hernia
- Can you push the mass back in with your hand? Have you ever had difficulty pushing the mass back into the abdomen?
- Have you ever had a hernia or operation on the other side?

Inspection

- NB!!! -> Done in standing position
- Size
- Shape ( piriform = indirect, globular = direct )
- Uni- or bilateral
- Skin
  - reddening of overlying skin
  - visible peristalsis
  - cough impulse- momentary bulge
Palpation
- Temperature
- Tenderness
- Impossible to get above the swelling
- Determine whether reducible or not
- Consistency - elastic => enterocele
  - doughy => omentocele
  - bag of worms => vericocele
  - tense & tender => strangulated
- Check for a cough impulse
- Inguinal Hernia => Medial to the pubic tubercle & above the inguinal lig.
- Femoral Hernia => Lateral to the pubic tubercle & below the inguinal lig.
- Acquired Hernia => The swelling finishes above the testis

Percussion
- Resonant => enterocele
- Dull => omentocele

Auscultation
- Peristalsis => enterocele
Congenital Hernia => The swelling incorporates the testis
Incarcerated Hernia => hernia that becomes stuck in the groin or scrotum and cannot be massaged back into the abdomen
Strangulated Hernia => occurs when blood supply to the incarcerated small intestine is jeopardized
Symptoms of a strangulated hernia include:
  - extreme tenderness and redness in the area of the bulge with increased local T˚
  - sudden pain that worsens in a short period of time
  - fever
  - rapid heart rate

Zeiman’s test
- 1.25cm above midpoint btw pubic symphysis & ant. sup. iliac spine => internal ring (indirect hernia)
- Just above & laterally to pubic tubercle => external ring (direct hernia)
- 4cm below & laterally to pubic tubercle => femoral ring (femoral hernia)

Internal Ring Occlusion Test
- 1.25cm above midpoint btw pubic symphysis & ant. sup. iliac spine
- While occluding the int. ring ask the patient to cough
- The hernia bulges out when the finger is removed \(\rightarrow\) **Positive** Internal Ring Occlusion Test \(\rightarrow\) Indirect inguinal hernia
- The hernia bulges medially to the occluding finger \(\rightarrow\) Direct inguinal hernia

Invagination Test
- Reduce the hernia
- Invaginate the scrotum
- Feel the pubic tubercle
• Assess its size => normally admits only 1 finger
• Its larger in case of a hernia

Now advance the finger through the external(supraficial) inguinal ring
• Finger moves along inguinal canal
• Upwards
• Backward
• Outwards
• When patient coughs the impulse is felt by the tip of the finger

INDIRECT INGUINAL HERNIA

Now advance the finger through the external(supraficial) inguinal ring
• Finger goes directly backwards through the defect of the posterior wall of the inguinal canal
• When patient coughs the impulse is felt by the pulp of the finger

DIRECT INGUINAL HERNIA

Look for a possible cause
• Tone of abdominal muscles
• Scars or ascitis
• Urethral stricture
• P.R exam for enlarged prostate
• Respiratory system for disease that may cause chronic cough (chronic bronchitis or T.B)

Treatment
• Patients with inguinal hernias can wear a special type of belt, called a truss, to support the hernia and keep it from bulging out.
• They should also avoid any activities that cause abdominal strain.

“Open” hernia repair
• The surgeon makes an incision in the groin, moves the hernia back into the abdomen, and reinforces the muscle wall with stitches (herniorrhaphy).
• Usually the area of muscle weakness is reinforced with a synthetic mesh or screen to provide additional support—an operation called hernioplasty.
• Lichtenstein repair

Laparoscopy
• shorter recovery time.
• not the best option if the hernia is very large
• Incarcerated and strangulated hernias require emergency surgery and hospitalization.
Thyroid Diseases

4 categories
- Developmental abn
- Inflammatory/autoimmune
- Hyperplastic/metabolic
- Neoplasms

Developmental abn
- Thyroglossal cyst (uncommon)
- Thyroglossal fistula (rare)

Inflammatory/autoimmune
- Hashimoto’s thyroiditis (common)
- Graves’ disease (fairly common)

Hyperplastic/metabolic
- Simple non-toxic colloid goitre (very common)
- Endemic goitre
- Physiological (common)

Neoplasms
- Papillary (relatively common)
- Follicular (relatively uncommon)
- Anaplastic (relatively uncommon)
- Medullary (very uncommon)

Hypothyroidism
TSH:
- High?
- Normal?

High TSH
T4:
- Low? - primary hypothyroidism
- Normal? - mild hypothyroidism

TPOAb:
- +ve? - T4 treatment
- -ve? - annual follow-up
  - TRO other causes if low T4

Normal TSH
Pituitary disease suspected?
- No? – no further tests
- Yes? – measure T4

T4:
- Normal? – no further tests
- Low? – TRO drug effects
  - sick euthyroid syndrome
  - evaluate anterior pituitary f(x)

Examination
- one lump?
- many lumps?
- diffuse enlargement?

Inspection
- Moves with swallowing?
- Sitting still?
- Under-/over-clothed?

x moves with swallowing

Solid:
- lymph node
- carotid body tumour

Cystic:
- cold abcess
- cystic hygroma

Hands
- Pulse?
- Moist/sweaty?
- Tremor?

Eyes
- Lid retraction/lid lag
- Exophthalmos
- Ophthalmoplegia
- Chemosis
Thyrotoxicosis
TSH:

• Low?
• Normal?

Low TSH
T4:

• High? – primary thyrotoxicosis
• Normal? – measure T3

T3:

• High? - T3 toxicosis
• Normal? - subclinical hyperthyroidism
  - f/up in 6-12 weeks

High T4/T3
Features of Graves’ disease:

• Diffuse goitre
• TPOAb +ve
• Ophthalmopathy
• Dermopathy

Multinodular goitre @ toxic adenoma?

• Yes? – toxic nodular hyperthyroidism
• No? – check radionuclide uptake

Low radionuclide uptake:

• Yes? - Destructive thyroiditis
  - Iodine/thyroid hormone excess
• No? – TRO other causes

Normal TSH
T4 :

• High? – TSH-secreting pituitary adenoma
  - thyroid hormone resistance syndrome
• Normal? – no further tests

Solitary nodule

• Thyroid status? – check TSH
• Benign/malignant? - FNA

Technetium-99m @ 123I

• Diffuse, homogeneous
• Generalised, patchy
• Cold nodule
• Hot nodule

Antithyroid drugs

• Carbimazole (rash, sore throat)
• Propylthiouracil
• Blocking-replacement regimen
Radioactive iodide therapy
(131I @ 125I)
- > 45 y/o
- Recurrent hyperthyroidism
- High risks patients for surgery

CI:
- Children
- Pregnant women

Surgery (subtotal thyroidectomy)
- x Anti-thyroid drugs, radioiodide treatment
- Grave’s disease (quick, effective)
- Toxic multinodular goitre (5-8g)
- Toxic solitary nodule

Preoperative management
- Laryngoscopy
- Anti-thyroid drugs, propranolol
- Lugol's iodine

Complications
- During operation
- After operation

During operation
- Haemorrhage (uncontrollable)
- Recurrent laryngeal nerve damage

After operation
- Early (w/in 12 hours)
- Late

Early postoperative
- Haemorrhage (major/mediastinal)
- Laryngeal oedema
- Thyrotoxic crisis
- Tracheomalacia

Thyrotoxic crisis
- Hyperthyroidism (thyroid storm)
- Fever (avoid aspirin)
- Altered mental state (mandatory)
- HF, AF (tachycardia)
- Diarrhoea (abd pain, vomiting)
- Volume depletion (correct cautiously)

Late postoperative
- Hypoparathyroidism
- Laryngeal nerve damage (recurrent/external)
- Hypothyroidism
- Recurrent thyrotoxicosis