Surgery

Susmit

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Chapter 1

CABG

1.1 Investigations for IHD

- ECG (first line)
- Cardiac enzymes (in acute coronary syndrome)
- Exercise tolerance test
- Echo: Evaluate
  - ventricular function
  - regional wall motion abnormalities
  - valvular lesions
- **Coronary angiography: gold std**
  - Extent, severity and location of stenoses
  - $>$ 70% reduction of diameter (i.e. $>$90% reduction of cross-sec) $\Rightarrow$ severe

1.2 Indications for surgery

- $>$ 50% stenosis of the left coronary artery ("*left main stem*")
- $>$ 50% stenosis of the proximal *LAD*
- 2/3 main coronary arteries diseased (*RCA, LAD, LCx*)

1.3 Graft selection

Types

- **Venous**: long saphenous vein
- **Arterial**:
  - LIMA most common
    - left internal mammary / left internal thoracic artery
    - Branch of *left subclavian*
  - Others
    - RIMA

- Radial
- Gastroepiploic
- Inf epigastric

Chapter 2

Shock

2.1 Definition

It is a state of **systemic hypoperfusion** that is **inadequate** for normal **cellular respiration**.

2.2 Pathophys

Cellular

- ↓ Perfusion → anaerobic meta → **lactic acidosis**.
- Eventually, *glucose runs out* → no more meta → ↓ ATP → **failure of Na-K pump** → **release of lysosomal enzymes** → intracellular contents e.g. K released into the bloodstream.

2.3 Classification

- **Hypovolaemic**
- **Cardiogenic**: MI, cardiomyopathy, valvular disease
- **Obstructive**: tamponade, tension pneumo, massive PE
- **Distributive**: systemic vasodilation, due to *histamine* (anaphylaxis) or *nitric oxide* (sepsis)*failure of neuroregulation* (neuro shock)
  - **Septic**
  - **Anaphylactic**
  - **Neurogenic**
- **Endocrine**: hypo/hyperthyroid, adrenal insufficiency (Addisonian crisis).

2.4 Features

- Cold, clammy skin: due to vasoconstriction (to maintain BP)
- Tachycardia: due to baroreflex response (to maintain BP)
- Hypotension
- Low urine output

Exceptions

- **distributive shock → vasodilation → warm skin**
- **neurogenic shock → loss of baroreflex response → bradycardia**

2.5 Sequelae of shock

- **Unresuscitable shock**
  - unresponsive to therapy
  - compensatory abilities lost due to cell death caused by prolonged ischaemia
  - death inevitable
- **Multi organ failure**
  - $\geq$ 2 failed organ systems
  - Cardiac: failure
  - Lung: ARDS
  - Kidney: Acute renal insufficiency
  - Clotting: DIC

2.6 Pathogenesis of Septic Shock

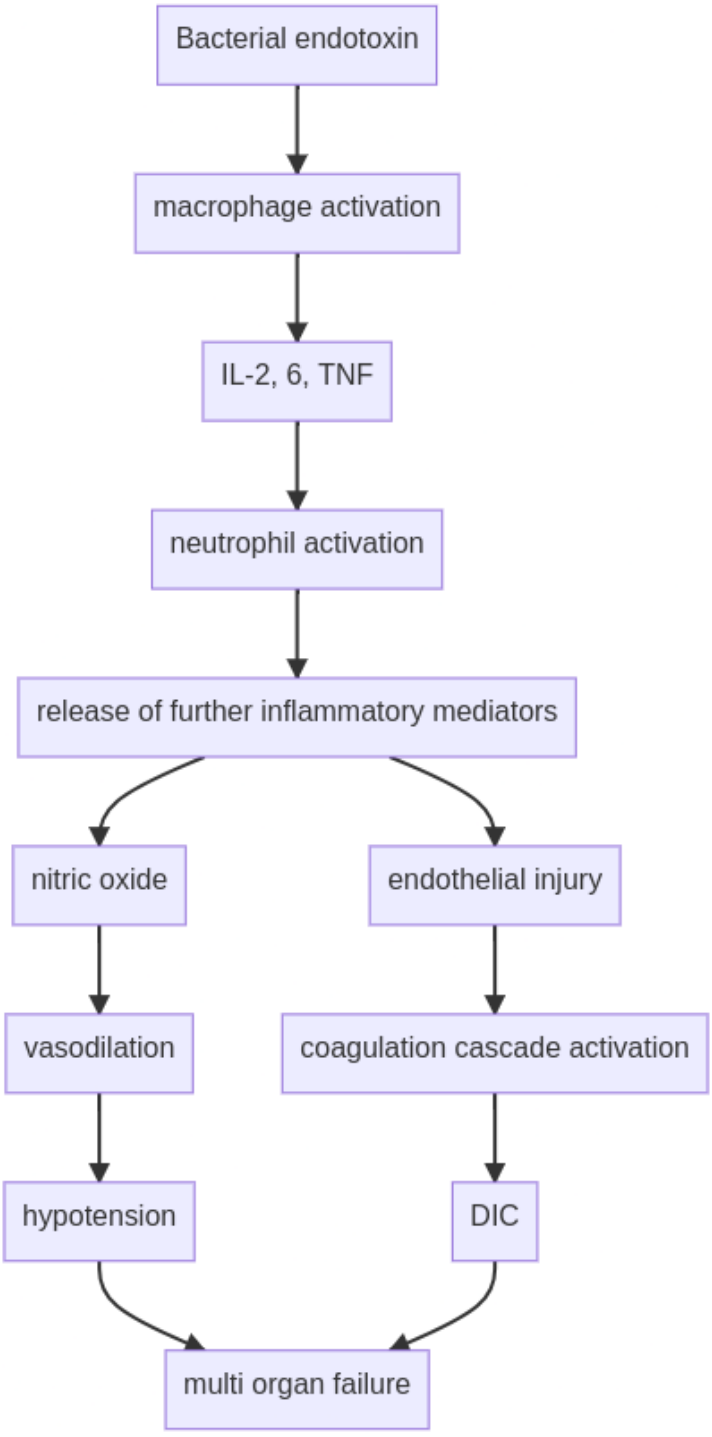


Figure 2.1: Pathogenesis of septic shock

2.7 Pathogenesis of Anaphylactic Shock

Allergen
↓
bind to IgE on mast cell
↓
cross-linking of IgE receptors
↓
mast cell degranulation
↓
histamine
↓
vasodilation
↓
shock

2.8 Management principles

General

- **Maintenance of ABC**
- **Monitor**
  - Minimum: **ECG, BP, pulse oximetry, urine output**
  - Additional:
    - CVP
    - Cardiac output
    - Base deficit
    - Serum lactate
- **Resuscitate**

Specific

- **Haemorrhagic**: blood trasnfusion
- **Cardiogenic**: inotropes (e.g. dobutamine)
- **Anaphylactic**:
  - epinephrine
  - antihistamines
  - steroids
- **Septic**:
  - norepinephrine/phenylephrine
  - broad spec antibiotics

Chapter 3

Blood transfusion

3.1 Indications

- Acute blood loss
- Periop anaemia
- Symptomatic chronic anaemia

3.2 Complications

Single transfusion

- Haemolysis (haemolytic transfusion reaction)
- Fever (febrile transfusion reaction)
- Allergic reaction
- Infections
  - Hep B, C
  - HIV
  - Malaria
  - Bacterial inf
- Air embolism
- Thrombophlebitis
- TRALI

Massive transfusion

- Coagulopathy
- Hypothermia
- Hypo-Ca
- Hypo-K
- Hyper-K

3.3 Blood & blood products

- Whole blood
- Components
  - Packed red cells
  - FFP
    - Plasma stored at -40 to -50°C
    - Rich in *coagulation factors*
    - 2y shelf-life
  - Cryoprecipitate
    - Supernatant of FFP
    - Rich in factor VIII, fibrinogen, and vWF (von Willebrand factor)
      - Without vWF, factor VIII has a very low half life. So normally in blood it's transported bound to vWF.
    - Stored at -30°C
    - Indications:
      - Haemophilia
      - Fibrinogen deficiency
      - Von Willebrand disease
  - Platelet concentrate
  - Prothrombin complex concentrate

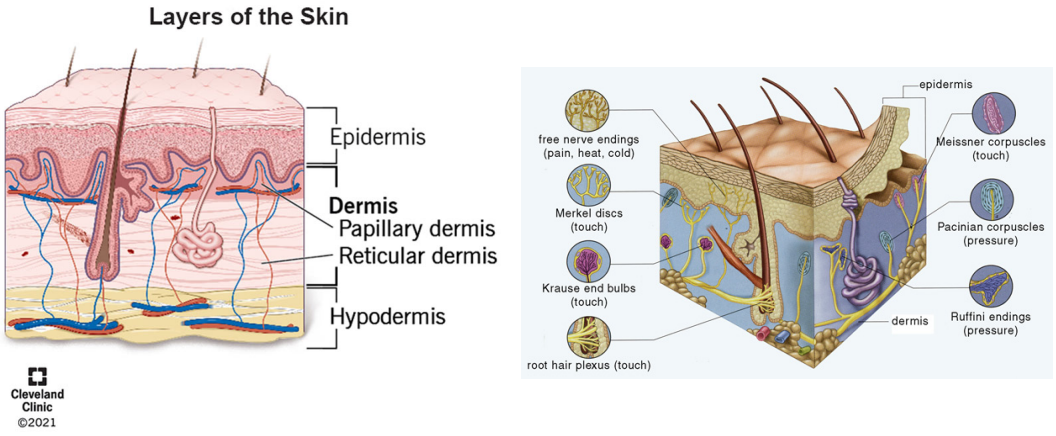
3.4 Clinical factoids

- Target Hb level: 10g/dL
- 1 unit transfusion = 1g/dL improvement

Chapter 4

Burns

4.1 Relevant skin histology



(a) Layers of the skin (b) Tactile receptors in the skin

Figure 4.1: Clinically relevant skin histology

- **Epidermis:** basal layer contains stem cells from which the epidermis can regenerate
- **Dermis:**
  - Papillary dermis: superficial
    - mostly loose areolar tissue
    - contains subpapillary vascular plexus
  - Reticular dermis: deep
    - mostly collagen
    - contains pilosebaceous units, sweat glands, nerves, deep vascular plexus (extending into subcutaneous layer)
- **Blisters:**
  - fluid collection between epidermis and dermis

  - due to loss of adhesion in dermoepidermal junction

- **Tactile receptors:**
  - Most are within dermis. Epidermis only contains free nerve endings and Merkel cells.
  - *Free nerve endings:*
    * heat, cold, pain, itching
    * located in papillary dermis and lower epidermis

4.2 Classification

Superficial partial-thickness burns

- Extend upto at most papillary dermis
- **Types**
  - **1st degree:**
    * extend upto *epidermis*
    * no blisters (as no loss of dermoepidermal adhesion)
  - **2nd degree:**
    * extend upto *papillary dermis*
    * blisters
- Blanch on pressure (as dermal capillaries are mostly unscathed)
- Painful (irritation of free nerve endings)
- Pinprick sensation intact
- Heal without scarring in 2 wks

Deep partial-thickness burns

- Extend upto reticular dermis (but not its entirety)
- *2nd degree*
- May blister
- Less/no blanching (as dermal capillaries have been burnt)
- Sensation reduced; unable to distinguish fine and crude touch
- Heal with hypertrophic scarring and contractures so need grafting

Full-thickness burns

- Destroy the whole thickness of dermis
- *3rd degree*
- No blanching
- Completely anaesthetised (nerve endings have been burnt off)
- Needle prick causes neither pain nor bleeding (capillary plexuses have been burnt off)

4.3 Mechanism of fluid loss

Intense inflammation in burnt areas → ↑ permeability → leakage of fluid into extravascular compartment

4.4 Assessment

- Rule of 9:
  - First approx
  - Adult
    - Head-neck → 9%
    - Each upper limb → 9%
    - Torso front 18%
    - Torso back 18%
    - Each lower limb 18%
    - Perineum 1%
- Lund and Browder chart
  - More accurate
- For smaller burns, a piece of paper about the size of the hand to measure the burnt area directly. Size of hand ≈ 1%.

4.5 Criteria for admission

- Suspected inhalation injury / airway injury
- Any burn likely to require surgery
- Any burns in the extremes of age
- Significant burns to the hands, feet, face or perineum (joint synaechia)
- Any suspicion of non-accidental injury

4.6 Fluid resuscitation

Indications

- **If >10% TBSA in children or >15% TBSA in adults** (B&L)
- To correct hypovolaemia
- " " electrolyte imbalance
- To prevent shock
- To provide nutrition

Principles

- **Parkland formula**: $4 \cdot W \cdot A$ mL fluid for the 1st 24h
  - Infuse $\frac{1}{2}$ over 8h, $\frac{1}{2}$ over 16h

- First 12h → crystalloid only (massive fluid shift to extravascular compartment takes protein out with it)
- Then add colloid (human albumin solution): Provides necessary oncotic pressure for keeping infused fluid within the vascular compartment

4.7 Definitive management

Superficial partial-thickness burns

- Regular dressing
- Heal spontaneously within 2 wks without scar irrespective of choice of dressing

Deep partial-thickness/full-thickness burns

- Nanocrystalline silver dressing until surgery (to prevent colonisation)
- Escharotomy for circumferential full-thickness burns
- Debridement + split-skin grafting
- Without surgery, heal by hypertrophic scarring

Nanocrystalline silver dressing

- 1% silver sulfadiazine
- 0.5% silver nitrate
- Mafenide nitrate
- Silver sulfadiazine + cerium nitrate

4.8 Prevention of post-burn contracture

- Joint exercise in full range during recovery period
- Topical silicon sheeting
- Saline expanders for scars

Chapter 5

Grafts and Flaps

5.1 Graft

- Tissue transferred *without its original blood supply*
- Need to revascularise in recipient site

Types of skin graft

- **Split-thickness skin graft**: epidermis + part of dermis
- **Full-thickness skin graft**: epidermis + whole dermis
- **Composite skin graft**: skin + cartilage, skin + fat etc.

5.2 Flap

- Tissue transferred *with its original blood supply*

5.3 Causes of graft failure

- Inadequate vascularity of recipient site: due to
  - residual pus
  - residual exudate
  - residual dead tissue
- Haematoma
- Shearing forces
- Group A β-haemolytic streptococcal infection
  - can destroy grafts completely, so contraindication to grafting

Chapter 6

Important anticancer drugs

- **Mitosis interferers**
  1. Vincristine
  2. Vinblastine
  3. Taxanes (e.g. Paclitaxel)
- **Antimetabolites** (i.e. DNA synthesis inhibitors)
  1. Methotrexate
  2. 5-FU
- **DNA damagers**
  1. Platinum drugs
     - Cisplatin
     - Carboplatin
     - Oxaloplatin
  2. Cyclophosphamide
  3. Bleomycin
  4. Doxorubicin
  5. Etoposide
- **Hormones**
  1. Tamoxifen: ER blocker (Breast ca)
  2. Goserelin: GnRH analogue/LHRH agonist; downregulate ant. pituitary $\rightarrow$ $\downarrow$ testosterone (Prostate ca)
  3. Flutamide: Androgen antagonist (Prostate ca)
  4. Bromocriptine: D2 agonist; blocks ant. pituitary stimul (Pituitary tumour)

Chapter 7

Deadly Dozen and ATLS

7.1 "Deadly dozen" of chest injury

Immediately life threatening

Manage in 1° survey

- Airway obstruction
- Tension pneumo
- Open pneumo
- Massive haemothorax
- Flail chest
- Pericardial tamponade

Potentially life threatening

Manage in 2° survey

- Tracheobronchial injury
- Oesophageal injury
- Aortic injury
- Myocardial contusion
- Pulmonary contusion
- Diaphragm rupture

Chapter 8

Lung cancer

8.1 Types

- Non-small cell (NSCLC)
  - Squamous
  - Adeno
  - Large cell
  - Carcinoid
- Small cell (SCLC)

8.2 Features

- Cough (esp. changing cough)
- Dyspnoea
- Haemoptysis
- Wt loss
- Chest pain
- Clubbing
- Pancoast → compress sympathetic trunk → *Horner's*
  - Miosis
  - Enophthalmos
  - Anhidrosis
  - Partial ptosis
- Paraneoplastic features (SCLC)
  - SIADH
  - Cushing
  - Lambert-Eaton
  - Hypercalcaemia
  - Carcinoid syndrome

8.3 Investigations

Diagnostic

- Chest X-ray
- Chest CT
- Sputum cytology
- Bronchoscopy + biopsy
- PET-CT

Staging

- USG whole abdomen
- X-ray skull
- Bone scintigraphy (aka isotope bone scan)
- Pleural fluid cytology (if effusion)

8.4 Treatment

- If NSCLC && within T3 N1 M0
  - Surgery: Choice depends on extent of pathology
    1. Segmentectomy
    2. Lobectomy
    3. Pneumonectomy
  - Chemo:
    1. Platins
    2. Gemcitabine
  - Radio
- Else (i.e. SCLC and > T3N1M0 NSCLC)
  - Palliative therapy
  - Surgery not helpful
  - Median survival: a few months

Chapter 9

Orthopaedics

9.1 Orthopaedic emergencies

Open DESC

- Open fracture
- Dislocation
  - Because dislocation ⇒ ruptured synovial membrane ⇒ stoppage of synovial fluid production ⇒ articular cartilage, which has no blood supply and derives nutrition from synoFlu, eventually dies ⇒ waiting too long can lead to permanent joint immobility
- Epiphyseal injury
- Septic arthritis
- Compartment syndrome

9.2 Osteomyelitis

Types

According to duration, *acute* and *chronic*.

Acute

■ Causative organisms

- *Staph aureus*
- *Strep pyogenes*
- *Strep pneumo* (pneumococcus)
- *Salmonella*
- *Pseudomonas*

■ Clinical features

- Severe pain
- Tenderness
- Restricted movement
- Raised local temperature
- Fever (high grade)
- Tachycardia

■ Radiology

- Early phase
  - MRI: more sensitive in early phase
    - bone oedema
    - periosteal elevation
  - X-ray:
    - may be normal
    - soft tissue swelling
- 5-7d later
  - X-ray:
    - osteopoenia
    - periosteal new bone formation

Chronic

■ Causative organisms

- TB (*Myco TB*)
- Syphilis (*Trepo pallidum*)
- Fungal
- Parasitic

■ **Clinical features**

- Chronic discharging sinus
- Pieces of bone may come out through the sinus
- Joint swelling, stiffness
- May be past history of acute osteomyelitis
- May be recurrent pain, fever, swelling (acute on chronic)

• **Sequestrum** A segment of bone that is

- Devitalised
- Avascular
- Surrounded by pus/granulation tissue

• **Involucrum**

- Subperiosteal bone deposition surrounding the sequestrum.
- Purpose: walling off the sequestrum
- *Cloaca*: opening in involucrum due to rising pressure of the pus underneath

■ **Radiology**

- Bony destruction
- Surrounding soft tissue swelling
- Sequestrum
- Subperiosteal reaction (involucrum)

■ **Management:**

Sequestrectomy and saucerization followed by **antibiotic therapy for 6 wks** according to C/S report of pus

Complications of osteomyelitis

- Chronic osteomyelitis (if acute)
- Deformity
- Pathological fractures
- Septic arthritis
- Septicaemia

9.3 Congenital clubfoot / talipes equinovarus

Terminology

- Talipes = clubfoot
- Equinus deformity ⇒ dorsiflexed foot
- Varus deformity ⇒ plantar surface turned *inwards* (in-verted)
- Valgus deformity ⇒ plantar surface turned *outwards* (e-verted)

Deformities in Congenital Clubfoot

CAVE

- Forefoot **C**avus
- Midfoot **A**dductus
- Hindfoot
  - **V**arus
  - **E**quinus

Treatment

- **Conservative: Ignacio Ponceti method**
  - Serial plastering over 6 wks to correct deformities
- **Surgical: PMR (postero-medial release)**
  - If conservative fails

9.4 Low Back Pain (LBP)

Causes

- **Mechanical:** strenuous work
- **Intervertebral disc pathologies**
  - **PLID** (Prolapsed lumbar intervertebral disc)
  - **Disc degeneration**
  - *Discitis*
- **Spinal pathologies**
  - **Spondylosis**: degenerative arthritis (osteoarthritis) of the spine
  - **Ankylosing spondylitis**
  - **Fractures**
  - **Paget's disease**
    - dysregulated remodelling: excessive resorption followed by disorganised osteogenesis
  - *Spondylolysis*: stress fracture in pars interarticularis
  - *Spondylolisthesis*: spondylolysis + forward slippage of vertebral body
  - *Spinal stenosis*: narrowed spinal canal → compression of spinal cord/nerve roots
  - *Scoliosis*
- **Neuropathic**
  - *Cauda equina syndrome*
    - Compression of cauda equina nerve roots
    - Most freq cause ⇒ lumbar disc protrusion at L4/5
- **Infectious**
  - **Pott's disease**
  - *Epidural abscess*
- **Metastatic cancer**
  - Sources:
    - Thyroid
    - Breast
    - Lung
    - Kidneys
    - Prostate

Investigations

- Plain X-rays
- CT: Best for assessing **bone anatomy**
- MRI: Detailed visualization of
  - Spinal cord

  - Meninges
  - Epidural space
  - Discs
  - Nerve roots
  - Bone marrow

- Bone scintigraphy
- DEXA (dual energy x-ray absorptiometry) scan: measure bone density
- Provocative discography
- Spinal biopsy

Chapter 10

Breast cancer

10.1 Aetiology

- Age
- Sex
- Genetic: family history (BRCA1, BRCA2, TP53)
- Geographic: ↑ in West
- Diet:
  - Low in phytoestrogens
  - High in alcohol
- ***Endocrine***: due to less exposure to *oestradiol*
  - More in
    - *Nullipara*
    - *Obese*: fat converts steroid hormones to oestradiol
    - *OCP/HRT* users
    - *Early menarche*
    - *Late menopause*
  - Less in
    - Breastfeeders
    - First child at early age

10.2 Features

- Hard lump (painful in <10%)
- Nipple discharge
- Nipple retraction
- In *advanced*,
  - Peau d'Orange ($\geq T_3$): due to lymphatic congestion
  - Ulceration ($\geq T_3$)
  - Fixation to chest wall ($\geq T_3$)
  - Palpable axillary nodes ($\geq N_1$)

- Constitutional
  - Wt loss
  - Anaemia
  - Anorexia

10.3 Staging

1. TNM
2. Manchester (i, ii, iii, iv)

TNM

- **T**: Tumour size
  - 1: < 2cm
  - 2: 2-5cm
  - 3: 5-10cm
  - 4: >10cm
- **N**: Nodal involvement
  - 0: No palpable axillary nodes
  - 1: Mobile palpable axillary nodes
  - 2: Fixed palpable axillary nodes
  - 3: Palpable supraclavicular nodes
- **M**:
  - 0: No distant mets
  - 1: Distant mets

Manchester

- **Stg-I** = $T_1N_0M_0$
- **Stg-II** = $T_2N_1M_0$
- **Stg-IIIa** = $T_3N_2M_0$
- **Stg-IIIb** = $T_4N_3M_0$
- **Stg-IV** = M_1 (irrespective of T and N stage)

10.4 Treatment

Options

- Surgery
  - Conservative
    - Lumpectomy
    - Quadrantectomy

        * Oncoplastic lumpectomy (lumpectomy + reconstruction to restore normal appearance)
    - Mastectomy
        * Simple
        * Radical
        * Modified radical mastectomy (MRM = simple + axillary node dissection)

- Chemo
- Radio
- Hormone: *tamoxifen*
- Immuno: *herceptin* (trastuzumab)

Protocol

- Stg-i: conservative surgery
- Stg-ii:
    - MRM + chemo + horm (if ER+) + immuno (if HER+)
- Stg-iii:
    - Neoadjuvant chemo 2-3 cycles to downstage
    - Then mx of stg-ii
- Stg-iv:
    - Palliative
    - Toilet mastectomy + chemo + radio + horm + immuno

Chapter 11

Random-ish general surgery concepts

11.1 Sepsis, SIRS, MODS, MSOF

- **SIRS (Systemic inflammatory response syndrome)**
  - **Any two** of
    - Hyperthermia (>38°C) or hypothermia (<36°C)
    - Tachycardia or tachypnoea
    - Leucocytosis or leucopoenia
  - Causes
    - Sepsis
    - Polytrauma
    - Burns
    - Pancreatitis without infection
- **Sepsis**
  - SIRS + documented infection
- **MODS (Multiple organ dysfunction syndrome)**
  - Systemic effect of SIRS
- **MSOF (Multiple system organ failure)**
  - End stage of uncontrolled MODS
  - Includes
    - Heart failure
    - Liver ""
    - Pulmonary ""
    - Shock

11.2 Haemorrhage

• 1°: Occurs immediately due to injury/surgery.

• Reactionary: Within 24h

- Due to
  - dislodgement of clot as a result of resuscitation and blood flow restoration
  - *slippage of ligature*

• 2°: Within 7-14d

- Due to sloughing off of vessel wall
  - Precipitated by
    - Infection
    - Pressure necrosis
    - Cancer

• Principles of haemorrhage control

- Pressure
- Position (elevation in case of limb)
- Packing
- Cautery (diathermy)
- Ligation

11.3 Incisions in abdominal surgery

■ Upper midline

- xiphoid → umbilicus

- **Structures cut**
  - Skin
  - Subcutaneous tissue
  - Linea alba
  - Fascia transversalis
  - Parietal peritoneum

- Advantages
  - Rapid
  - Less vascular area ⇒ less bleeding

- Disadvantages
  - Less vascular area ⇒ heals late
  - ↑ wound dehiscence, incisional hernia

■ Kocher / right subcostal

- From xiphoid, start cutting 2.5cm below parallelly to the costal margin
- Keep cutting till cut length = 10cm
- **Structures cut**: ???
- Use: gallbladder surgeries, rt hepatic lobectomy

■ Pfannenstiel

- Curved, 2.5cm above and parallel to the arch made by inguinal ligaments, extend equally on both sides of the midline
- Done in
  - Caesarean section
  - Prostatectomy
  - Bladder surgery

Chapter 12

Vascular surgery

12.1 Deep Vein Thrombosis (DVT)

Formation of semisolid coagulum in a deep vein.

Virchow's triad

- Abnormal surface (endothelial damage)
- Abnormal flow (stasis / turbulence)
- Abnormal blood (thrombophilia)

Factors

- Immobility
  - Age
  - Obesity
  - Prolonged surgery
  - Pregnancy
  - Puerperium
  - Varicosity (effect of immobility, the rest are causes)
- Hormone-replacement therapy (high oestrogen)
- Previous DVT / PE
- Thrombophilia

Common sites

- Popliteal vein
- Femoral ""
- Iliac ""

Prevention

- Early mobilization
- Hydration

- Compression stockings
- Prophylactic LMW heparin
- Calf pumps
- Minimal use of tourniquets

12.2 Ischaemic limb

(Ischaemia = reduced blood flow, NOT cell death)

Features

- **Intermittent claudication**
  - Debilitating crampy myalgia that is
    - reliably brought on by walking
    - not present on taking the first step
    - reliably relieved by rest
  - Raised workload while walking → anaerobic metabolism → intermittent claudication
- **Rest pain**
  - Advanced ischaemia
  - Anaerobic metabolism occurring even at rest
  - Exacerbated by lying down / foot elevation (due to loss of gravitational aid in flow) → *pain worse at night* and *relieved by hanging the foot out of the bed.*
- Coldness, numbness, paraesthesia, colour change
- Ulceration
- Gangrene
- **Absent/diminished arterial pulse**
- Arterial bruit
- **Slow capillary refill**

Investigations

■ Specific

- Doppler USG
- Duplex scan:
  - Duplex = plain USG + doppler
  - Plain USG shows anatomy, doppler shows flow patterns
- Digital subtraction angiography
- CT angiography, MR angiography

■ General

- CBC (see if anaemia)
- RBS

- Lipid profile
- Serum urea and electrolytes

Treatment

■ **Non-surgical**

- **Smoking cessation**
- Regular exercise
- Wt loss if obese
- **Drugs**
  - Beta blocker contraindicated: as sympathetic increases blood flow to muscles
  - Statin
  - Clopidogrel/aspirin
- **Angioplasty** with/without stenting

■ **Surgical**

- **Bypass operation**

12.3 Peripheral Artery Disease (PAD)

6Ps of PAD

- Pain
- Paraesthesia
- Pulselessness
- Pallor
- Paralysis
- Polar (cold)

PAD vs PVD

- P**A**D relieved by h**a**nging the limb down, P**V**D relieved by ele**v**ating the limb up.

Investigations

- ABPI: ankle-brachial pressure index
  - <0.9 indicates PAD
- Doppler
- Duplex
- DSA
- CTA, MRA

12.4 Varicose veins

Management principles

- **Avoid prolonged standing**
- **Compression stockings**
- **Endothermal ablation**
  - *Laser ablation*
  - *Radiofrequency ablation*
- **US-guided sclerotherapy**
  - Sclerosing agent: sodium tetradecyl sulfate
- **Surgery**
  - Sapheno-femoral junction (SFJ) ligation + great saphenous vein (GSV) stripping (*Trendelenburg operation*)

Chapter 13

Splenectomy

13.1 Indications

(*Indications marked with ⋆ are absolute indications*)

- Traumatic rupture with unsalvageable spleen ⋆
- Splenic tumours (primary or secondary) ⋆
- Bleeding varices due to splenic vein thrombosis ⋆
- Hereditary spherocytosis ⋆
- Splenic abscess
- Hypersplenism
  - Hypersplenism = splenomegaly + any cytopoenia(s) + improvement of symptoms after splenectomy
- ITP
- Thalassaemia major

Chapter 14

Urology

14.1 LUTS (lower urinary tract symptoms)

- **Storage symptoms**: FUN
  - Frequency
  - Urgency
  - Urge incontinence
  - Nocturia
- **Voiding symptoms**: IHPS
  - Intermittency
  - Hesitancy
  - Poor stream (reduced stream)
  - Straining (muscular effort to initiate maintain or improve urinary flow)
- **Post-micturitional symptoms**
  - Incomplete emptying
  - Post-mic dribble

14.2 Renal stones

Features

- Asymptomatic
- Ureteric colic: loin → groin
- Renal pain: dull loin pain
- Haematuria
- Features of UTI, e.g.:
  - Frequency: too frequent voiding
  - Urgency: sudden compelling desire to urinate
  - Dysuria: burning pain during urination
  - Features of pyelonephritis (if ascending infection), e.g.:
    - Fever with chills

    - Vomiting
    - Renal angle tenderness
    - Rigidity, guarding

Investigations

- X-ray KUB, IVU
- USG KUB
- CT KUB
- Urine RME, culture

Treatment

- Assess size of stone by USG/CT
- **Small ($\leq$ 5mm)**:
    - Conservative management
    - 90% pass spontaneously
    - Drink plenty of water
    - Analgesics, antispasmodics
    - Antiemetics
    - Mobility
- **$>$ 5mm**:
    - ESWL
        - for $\leq$ 1.5cm stones
        - cystine stones resistant
        - results in *steinstrasse* ("stone street")
        - contra
            - obese
            - pregnant
            - patients on oral anticoagulants
    - Ureteroscopy + retrieval by Dormia basket: for <6mm stones in distal ureter
    - PCNL
        - for larger stones / ESWL contraindications / ESWL resistant stones
    - Open surgeries: depending on location of stone
        - Nephrolithotomy
        - Pyelolithotomy
        - Ureterolithotomy

14.3 Bladder stones

Features

- 8x more common in males
- Asymptomatic
- Frequency
- Sense of incomplete voiding
- Pain (strangury)
  - at the end of micturition
  - referred to the tip of the penis or the labia majora
- Haematuria: terminal, few drops, bright red

Investigations: usual

Treatment

- *Perurethral litholapaxy*
- *Percutaneous suprapubic litholapaxy*
- *Suprapubic cystolithotomy*

14.4 Ruptured urethra

Features

- Perineal bruising & haematoma
- Bleeding from urethral meatus
- Urinary retention
- Pain

Investigations

Confirmed by **urethrography** with water-soluble contrast

- Urethrogram = insert catheter upto urethral meatus, then inject contrast and image with x-rays

Management

- Antibiotics
- Analgesics
- **Catheterisation** by percutaneous suprapubic puncture (Seldinger technique)
- *After bruising and swelling have setted* (8-12wks later), **delayed anastomotic urethroplasty**.

14.5 Bladder cancer

Painless haematuria in 60yo male

4T

- Tumours
  - ***Painless gross haematuria, until proved otherwise, is bladder cancer***
- TB
- Tension (hypertensive nephropathy)
- Tubular necrosis (ATN)

Features

- Painless gross haematuria
  - may lead to large clots in the bladder → clot retention
- Frequency
- Pain may arise in later stages due to
  - extravesical spread
  - pyelonephritis

Investigations

- Urine culture and cytology for malignant cells
- Hb, urea, electrolytes
- CT, MRI, USG, IVU
- *Cystourethroscopy*

Treatment

- **Non-muscle invasive tumour**: (does not invade the detrusor)
  - **Endoscopic resection** followed by **intravesical BCG** chemotherapy
- **Muscle-invasive tumour**
  - External beam radiotherapy
  - Surgery
    - Partial cystectomy
    - Radical cystectomy and pelvic lymphadenectomy

14.6 Prostate cancer

Features

- Asymptomatic until advanced
- In advanced,
  - Bladder outlet obstruction (boo) → retention
  - Pelvic pain
  - Haematuria
  - Bone pain, arthritis
  - Renal failure
  - Anaemia, pancytopoenia
- DRE:
  - Hard irregular lump
  - Median sulcus obliterated
  - Examining finger blood stained

Investigations

- **Prostate biopsy**
  - *Transperineal* approach: under G/A
  - *Transrectal* approach: under L/A
- **PSA**
  - Normal: < 4ng/mol
  - > 10ng/mol: suggestive
  - > 35ng/mol: almost diagnostic of advanced carcinoma
- LFT: liver mets
- ALP: liver or bone mets
- Chest x-ray: lung/rib mets

Treatment

- **Early stage**:
  - *radical prostatectomy*
  - radiotherapy
    - external beam radiotherapy or
    - brachytherapy
- **Late stage**:
  - *orchidectomy* ("surgical castration")
  - *medical castration*
    - stilbestrol
    - LHRH agonists: goserelin

  - radiotherapy
  - chemo: docetaxel

14.7 Testicular tumours

Classification

- Germ cell tumours
  - Seminoma
  - Nonseminomatous GCT
    - Embryonal carcinoma
    - Yolk sac tumour
    - Choriocarcinoma
    - Teratoma
- Interstitial cell tumours
  - Sertoli → *feminizes*
  - Leydig → *masculinizes* (secretes androgens)
    - layDICK → masculin
- Lymphoma

Features

- Painless testicular lump
- Heaviness (if 2-3x enlarged)
- Gynaecomastia (especially with *NSGCT*)
- Acute swelling and severely painful testis
  - due to bleeding in the tumour
- Metastatic features
  - abdominal mets: abdominal pain
  - lung mets: dyspnoea, chest pain, haemoptysis

Investigations

- **Confirmed by USG**
- AFP: ↑ in NSGCT
- hCG: ↑ both seminoma and NSGCT
- X-ray / CT of chest, abdomen, pelvis: for staging

Treatment

Orchidectomy, followed by

- Histopathology: for histological classification

- Stg I
  - **Seminoma**: radiosensitive, only radiotherapy + follow-up
  - **NSGCT**
    - not radiosensitive
    - **BEP chemotherapy**
      - Bleomycin
      - Etoposide
      - Platinum (cisplatin)
- Stg II-IV
  - **BEP chemotherapy** for both seminoma and NSGCT

Chapter 15

GIT, hepatobiliary, pancreas

15.1 Acute Pancreatitis

Causes

- Gallstone
- ERCP
- Trauma
- Alcoholism
- Hyperparathyroidism
- Hypercalcaemia
- Autoimmune
- Drugs: corticosteroids,azathioprine

Features

- Pain
  - Severe epigastric pain
  - Radiates to back in 50%
  - Relieved by leaning forwards
  - Can mimic most other causes of acute abdomen
- Nausea, vomiting, retching
- Shock
  - Tachycardia, tachypnoea, hypotension
  - SIRS
- Bleeding into fascial planes → bluish discoloration of
  - Flanks: Gray-Turner's
  - Umbilicus: Cullen's
- Muscle guarding
- Pleural effusion

Investigations

- Clinical assessment + **serum amylase (>3x above normal)** indicative of acute pancreatitis
- Serum lipase: more sensitive and specific
- USG: detect gallstones
- X-ray, CECT: exclude other causes of acute abdomen

Severity assessment

- Ranson, Glasgow, APACHE scoring
- Atlanta classification
  - Mild:
    - no organ failure
    - no local/systemic complis
  - Moderate: transient organ failure (resolves by 48h)
  - Severe: persistent organ failure (>48h)

Treatment

- **Mild**
  - observation
  - IV fluid
  - analgesic (no need for antibiotics)
  - antiemetic
- **Severe**
  - HDU/ICU admission
  - IV fluids
  - Analgesic: pethidine (morphine contraindicated; causes sphincter of Oddi dysfunction)
  - Antibiotics: IV cefuroxime, or imipenem, or cipro+metro
  - O2 inhalation
  - Invasive monitoring of vitals, CVP, blood glucose
  - ERCP within 72h if severe gallstone pancreatitis/signs of cholangitis

Complis

- Systemic (mostly manifest within the 1st wk)
  - CVS: Shock
  - Haemato: DIC
  - Resp: ARDS
  - Renal: Acute renal failure
  - Metabolic:
    - Hypo-Ca
    - Hyperglycaemia

        * Hyperlipidaemia

- Local (usually occur after the 1st wk)
    - Pseudocyst
    - Abscess
    - Pancreatic necrosis
    - Peripancreatic fluid collection
    - Pancreatic ascites
    - Pleural effusion
    - Portal/splenic vein thrombosis

15.2 Pancreatic pseudocyst

Definition

Collection of amylase-rich fluid enclosed by a wall of fibrous/granulation tissue.

Diagnosis

- History of recent pancreatitis ($\geq$ 4wks)
- USG
- CT
- FNA of fluid under EUS guidance and measurement of
    - CEA
    - amylase
    - cytology
- Differentiating from cystic neoplasm:
    - history
    - appearance in US, CT
    - Aspiration:
        * CEA: $\uparrow$ in tumour
        * Amylase: $\uparrow$ in pseudocyst
        * Cytology: inflammatory cells in pseudocyst

15.3 Chronic pancreatitis

- Mostly due to chronic alcoholism

Features

- Pain
    - may radiate to back
    - dull, gnawing

- Nausea, vomiting
- Wt loss (due to anorexia)
- Steatorrhoea
- Symptoms of DM

Investigations

- Serum amylase: ↑ in early stg
- X-ray abdomen, CT: calcifications
- CT, MRI
- MRCP: identify biliary obstruction, condition of pancreatic duct
- ERCP

Treatment

- Relieve pain
- Cure addiction
- Diet: low fat, high protein & carb
- Fat-soluble vitamin supplementation
- Pancreatic enzymes supplementation
- Insulin therapy
- Steroid for autoimmune pancreatitis

15.4 Gallstones

Types

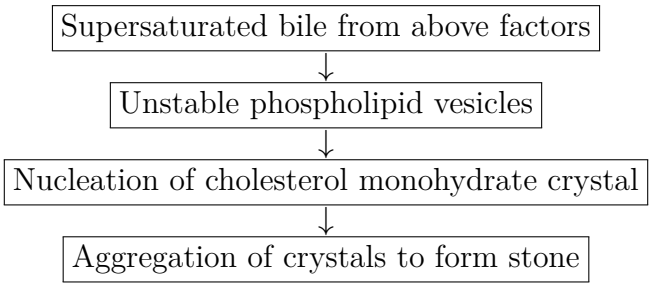
- Cholesterol: more common in USA
- Pigment: more common in BD
  - Black: haemolysis
  - Brown: bile stasis
- Mixed

Factors

- **Supersaturated bile**: female fair fatty forty fertile
  - Age: Forty (>40y)
  - Sex: Female
  - Fatty (obese)
  - Fair-skinned
  - OCP
  - Diet: Fat high, fibre low
- **Impaired GB function**
- **Cholesterol nucleating factors**
- **Enterohepatic circulation of bile**

  - ileal resection → ↓ enterohepatic circulation → depletion of bile pool → increased cholesterol with respect to bile → supersaturation

Pathogenesis



15.5 Carcinoma head of the pancreas

Treatment options

- **Whipple's**:
  - in resectable cases
  - pancreaticoduodenectomy
- **Palliative**:
  - unresectable cases
  - if detected to be unresectable during laparotomy (to do Whipple's), then choledochoenterostomy to relieve jaundice
  - if detected by imaging, dilate by ERCP to relieve jaundice
  - enzyme replacement
  - treatment of DM
  - chemotherapy