

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) => 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

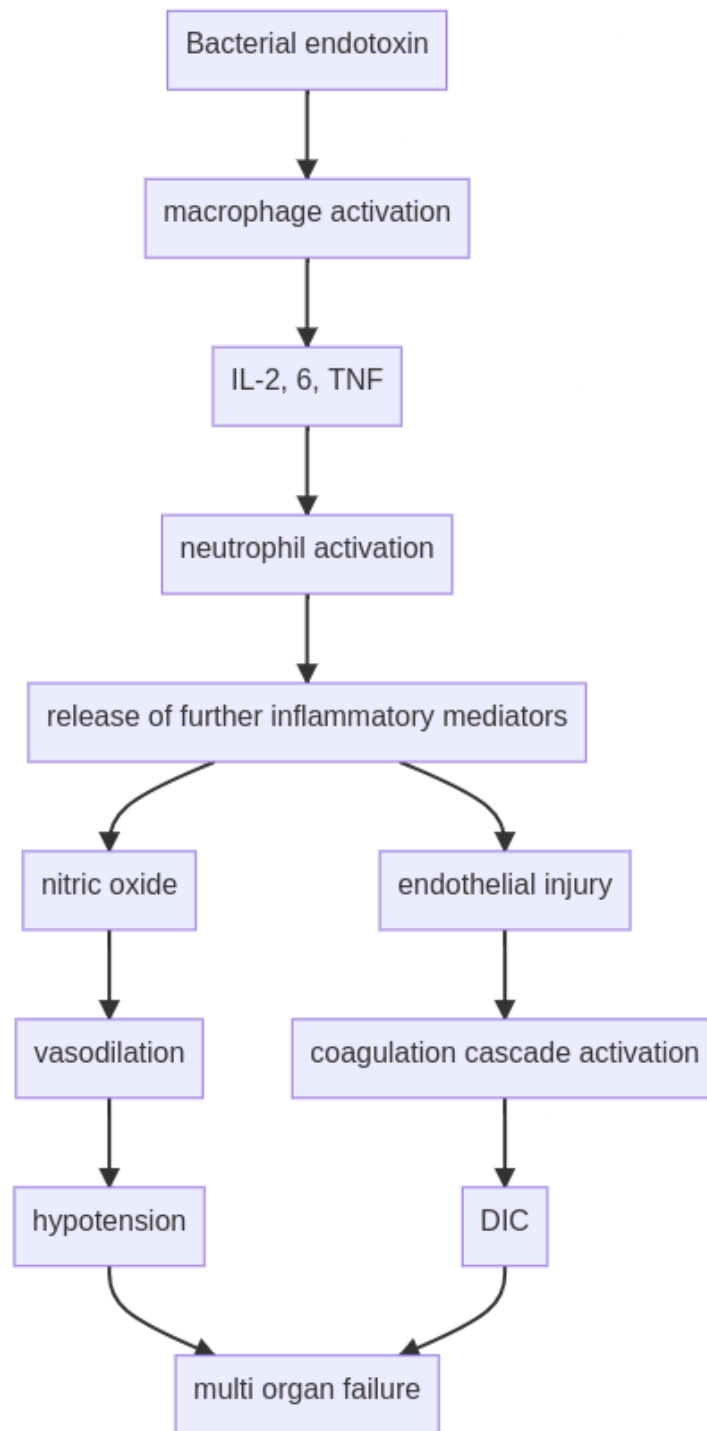


Figure 2.1: Pathogenesis of septic shock

## 2.7 Pathogenesis of Anaphylactic Shock



## 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

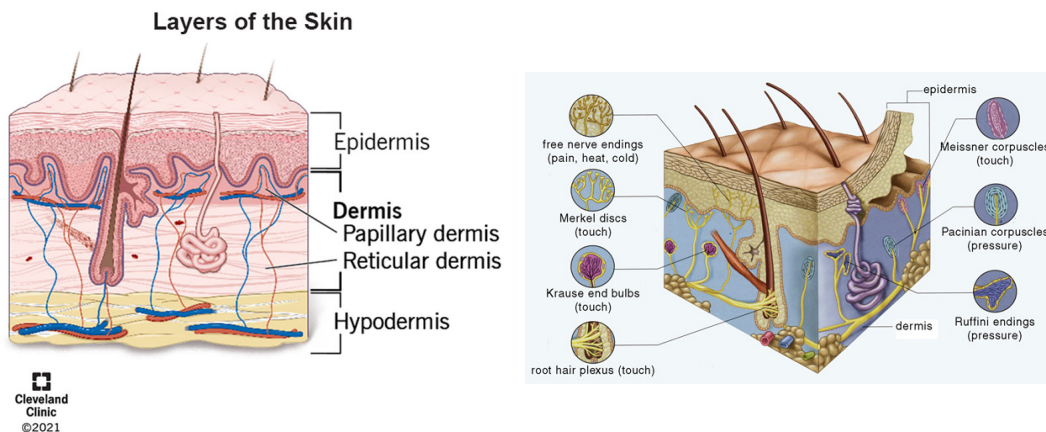
### 3.4 Clinical factoids

- 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  $\rightarrow$   $\uparrow$  permeability  $\rightarrow$  leakage of fluid into extravascular compartment

## 4.4 Assessment

- Rule of 9:
  - First approx
  - Adult
    - \* Head-neck  $\rightarrow$  9%
    - \* Each upper limb  $\rightarrow$  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  $\approx$  1%.

## 4.5 Criteria for admission

- Suspected inhalation injury / airway injury
- Any burn likely to require fluid resuscitation / surgery
- Any burns in the extremes of age
- Significant burns to the hands, feet, face or perineum
- Any suspicion of non-accidental injury
- Any burn with potentially serious sequelae (e.g. high tension electrical burns)

## 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  $\rightarrow$  crystalloid only (massive fluid shift to extravascular compartment takes protein out with it, so colloids of no use)
- 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  $\beta$ -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 → ↓ 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<sup>o</sup> survey*

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

#### Potentially life threatening

*Manage in 2<sup>o</sup> 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  $\Rightarrow$  ruptured synovial membrane  $\Rightarrow$  stoppage of synovial fluid production  $\Rightarrow$  articular cartilage, which has no blood supply and derives nutrition from synoFlu, eventually dies  $\Rightarrow$  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:
    - \* osteopenia
    - \* periosteal new bone formation

### Chronic

#### ■ Causative organisms

- TB (*Myco TB*)
- Syphilis (*Trepa 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  $\Rightarrow$  dorsiflexed foot
- Varus deformity  $\Rightarrow$  plantar surface turned *inwards* (in-verted)
- Valgus deformity  $\Rightarrow$  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:  $\uparrow$  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-IIa** =  $T_3N_2M_0$
- **Stg-IIb** =  $T_4N_3M_0$
- **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 ( $>38^{\circ}\text{C}$ ) or hypothermia ( $<36^{\circ}\text{C}$ )
  - Tachycardia or tachypnoea
  - Leucocytosis or leucopenia
- 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

- PAD relieved by hanging the limb down, PVD relieved by elevating 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 ( $\leq 5\text{mm}$ ):**
  - Conservative management
  - 90% pass spontaneously
  - Drink plenty of water
  - Analgesics, antispasmodics
  - Antiemetics
  - Mobility
- **> 5mm:**
  - ESWL
    - \* for  $\leq 1.5\text{cm}$  stones
    - \* cystine stones resistant
    - \* results in *steinstrasse* (“stone street”)
    - \* contra
      - obese
      - pregnant
      - patients on oral anticoagulants
  - Ureterscopy + retrieval by Dormia basket: for  $<6\text{mm}$  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 settled (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, pancytopenia
- 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 ( $\geq 4$  wks)
- 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

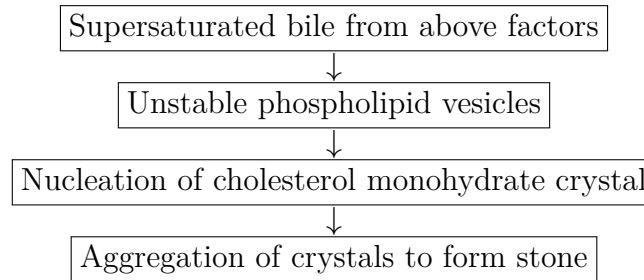
- Cholesterol: more common in USA
- Pigment: more common in BD
  - Black: haemolysis
  - Brown: bile stasis
- Mixed

## 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 choledochostomy to relieve jaundice
  - if detected by imaging, dilate by ERCP to relieve jaundice
  - enzyme replacement
  - treatment of DM
  - chemotherapy