

# 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**

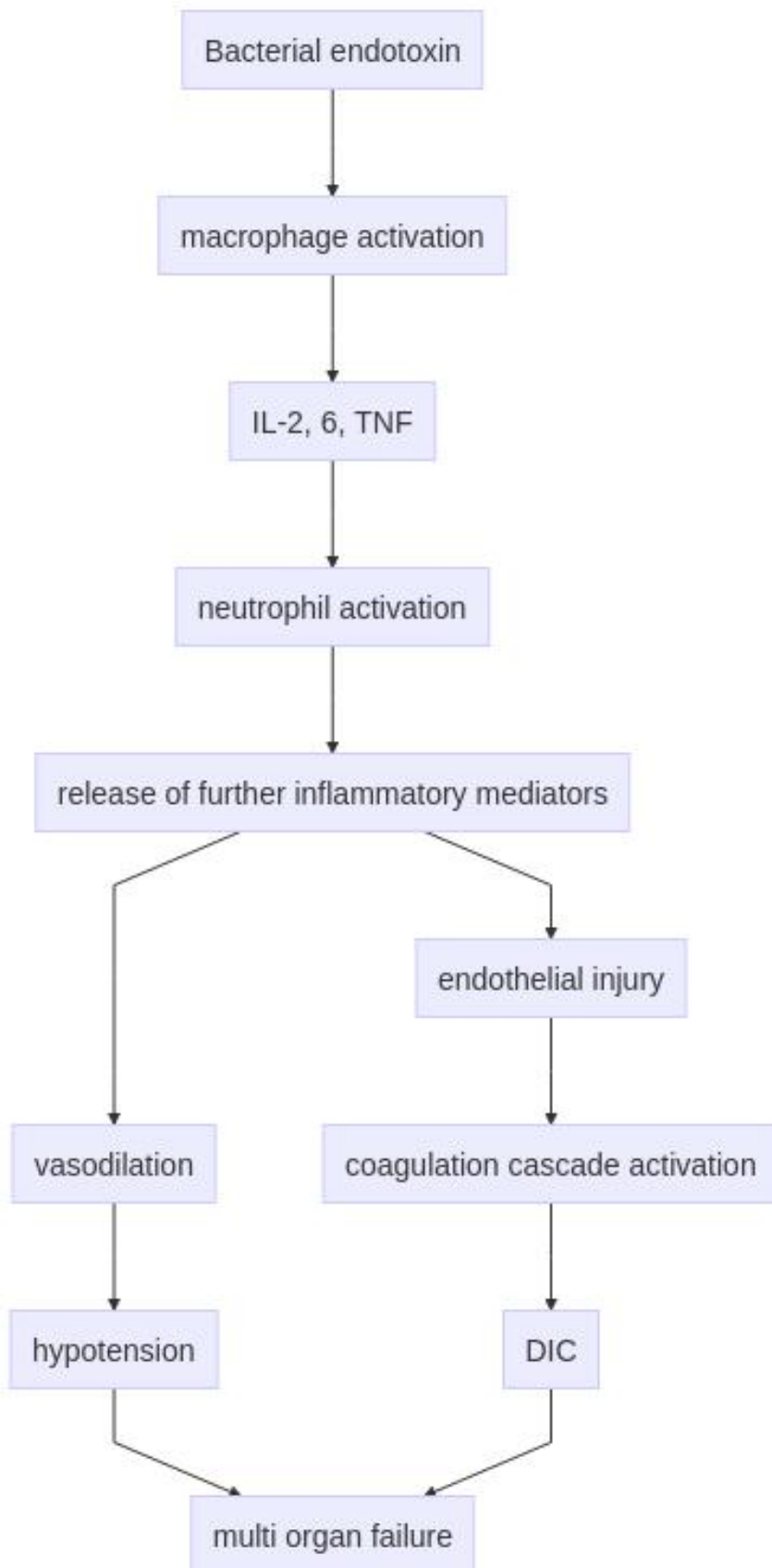
## 2.5 Sequelae of shock

- **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

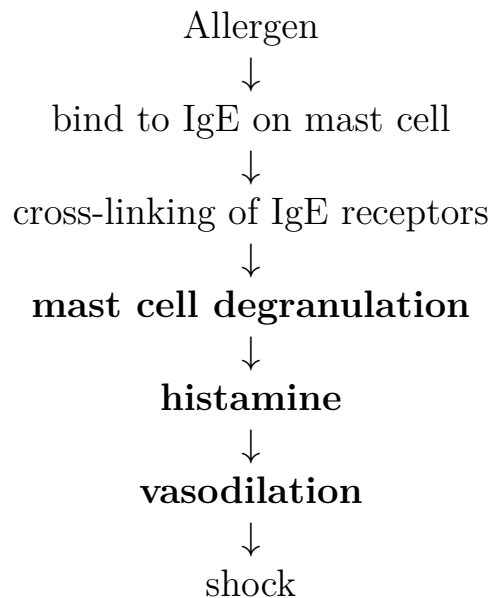




## 2.6 Pathogenesis of Septic Shock



## 2.7 Pathogenesis of Anaphylactic Shock



## 2.8 Management principles

- **Monitor**
  - Minimum: **ECG, BP, pulse oximetry, urine output**
  - Additional:
    - \* CVP
    - \* Cardiac output
    - \* Base deficit
    - \* Serum lactate
- **Resuscitate**
- Inotropes (e.g. dobutamine): if cardiogenic shock
- Epinephrine: if anaphylactic shock
- Norepinephrine: if septic

# 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 Mechanism of fluid loss

Intense inflammation in burnt areas  $\rightarrow$   $\uparrow$  permeability  $\rightarrow$  leakage of fluid into extravascular compartment

### 4.2 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%.

### 4.3 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

## 4.4 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

## 4.5 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



# 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

- hence, 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

## 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

- **Strenuous work**
- **Primary Back Pathologies**
  - *Spondylosis*: degenerative arthritis of the spine
  - *Spondylolysis*: defect in pars interarticularis without slippage
  - *Spondylolisthesis*: forward slippage of vertebral body
  - Lumbar *disc herniation*
  - *Spinal stenosis*: narrowed spinal canal → compression of spinal cord/nerve roots
  - *Fractures*
  - *Cauda equina syndrome*
    - \* Compression of cauda equina nerve roots
    - \* Most freq cause ⇒ lumbar disc protrusion at L4/5
  - *Scoliosis*
  - *Discitis*
- **Infections**
  - *Epidural abscess*
  - *Pott's disease*
- **Metastatic disease**
  - Sources:
    - \* Thyroid
    - \* Breast
    - \* Lung
    - \* Kidneys
    - \* Prostate
- **Autoimmune conditions**
  - *Ankylosing spondylitis*

## 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:  $< 2\text{cm}$
  - 2:  $2\text{-}5\text{cm}$
  - 3:  $5\text{-}10\text{cm}$
  - 4:  $>10\text{cm}$
- **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}

- **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  $\Rightarrow$  less bleeding
- Disadvantages
  - Less vascular area  $\Rightarrow$  heals late
  - $\uparrow$  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
- Open 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  $\rightarrow$  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
- **$> 5\text{mm}$ :**
  - ESWL

- \* for  $\leq 1.5\text{cm}$  stones
- \* cystine stones resistant
- \* results in *steinstrasse* (“stone street”)
- \* contra
  - obese
  - pregnant
  - patients on oral anticoagulants
- Ureteroscopy + 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



- O<sub>2</sub> inhalation
- Invasive monitoring of vitals, CVP, blood glucose
- ERCP within 72h if severe gallstone pancreatitis/signs of cholangitis

## Complics

- 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

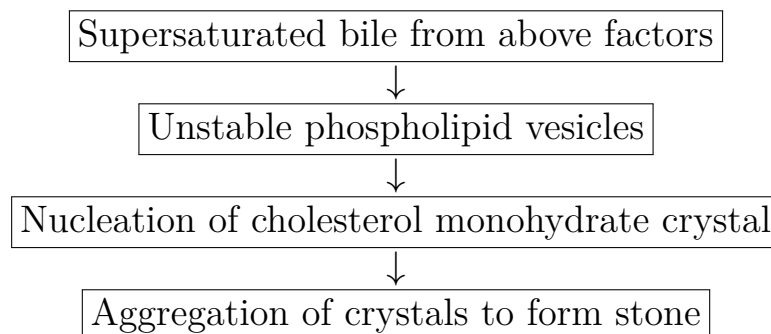
### Types

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