

Surgery

Susmit

2022-06-23

Contents

Deep Vein Thrombosis (DVT)	4
Virchow's triad	4
Factors	4
Common sites	4
Prevention	4
CABG	5
Investigations for IHD	5
Indications for surgery	5
Graft selection	5
Types	5
Blood transfusion	6
Indications	6
Complications	6
Single transfusion	6
Massive transfusion	6
Blood & blood products	6
Clinical factoids	7
Burns	8
Mechanism of fluid loss	8
Assessment	8
Fluid resuscitation	8
Indications	8
Principles	8
Definitive management	8
Superficial partial-thickness burns	8

Deep partial-thickness/full-thickness burns	9
Nanocrystalline silver dressing	9
Grafts and Flaps	10
Graft	10
Types of skin graft	10
Flap	10
Causes of graft failure	10
Important anticancer drugs	11
Varicose veins	12
Management principles	12
Deadly Dozen and ATLS	13
“Deadly dozen” of chest injury	13
Immediately life threatening	13
Potentially life threatening	13
Lung cancer	14
Types	14
Features	14
Investigations	14
Diagnostic	14
Staging	14
Treatment	15
Low Back Pain (LBP)	16
Causes	16
Investigations	16
Orthopaedic emergencies	17
Osteomyelitis	18
Types	18
Acute	18
Causative organisms	18
Clinical features	18
Radiology	18
Chronic	18

Causative organisms	18
Clinical features	19
Sequestrum	19
Involucrum	19
Radiology	19
Management	19
Complications of osteomyelitis	19
Congenital clubfoot / talipes equinovarus	20
Terminology	20
Deformities in Congenital Clubfoot	20
Treatment	20
Conservative: Ignacio Ponceti method	20
Surgical: PMR (postero-medial release)	20

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

CABG

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

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*)

Graft selection

Types

- **Venous:** long saphenous vein
- **Arterial:**
 - LIMA most common (left internal mammary / left internal thoracic artery)
 - Others
 - * RIMA
 - * Radial
 - * Gastroepiploic
 - * Inf epigastric

Blood transfusion

Indications

- Acute blood loss
- Periop anaemia
- Symptomatic chronic anaemia

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

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* and *fibrinogen*
 - * Stored at -30°C
 - * 2y shelf-life
 - Platelet concentrate
 - Prothrombin complex concentrate

Clinical factoids

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

Burns

Mechanism of fluid loss

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

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%.

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)
- Then add colloid (human albumin solution)
 - Provides necessary oncotic pressure for keeping infused fluid within the vascular compartment

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

Grafts and Flaps

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.

Flap

- Tissue transferred *with its original blood supply*

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
 - hence, contraindication to grafting

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; downregulate ant. pituitary → ↓ testosterone (Prostate ca)
 3. Flutamide: Androgen antagonist (Prostate ca)
 4. Bromocriptine: D2 agonist; blocks ant. pituitary stimul (Pituitary tumour)

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*)

Deadly Dozen and ATLS

“Deadly dozen” of chest injury

Immediately life threatening

Manage in 1^o survey

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

Potentially life threatening

Manage in 2^o survey

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

Lung cancer

Types

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

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

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)

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

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

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

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 (*Mycobacterium TB*)
- Syphilis (*Treponema 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

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