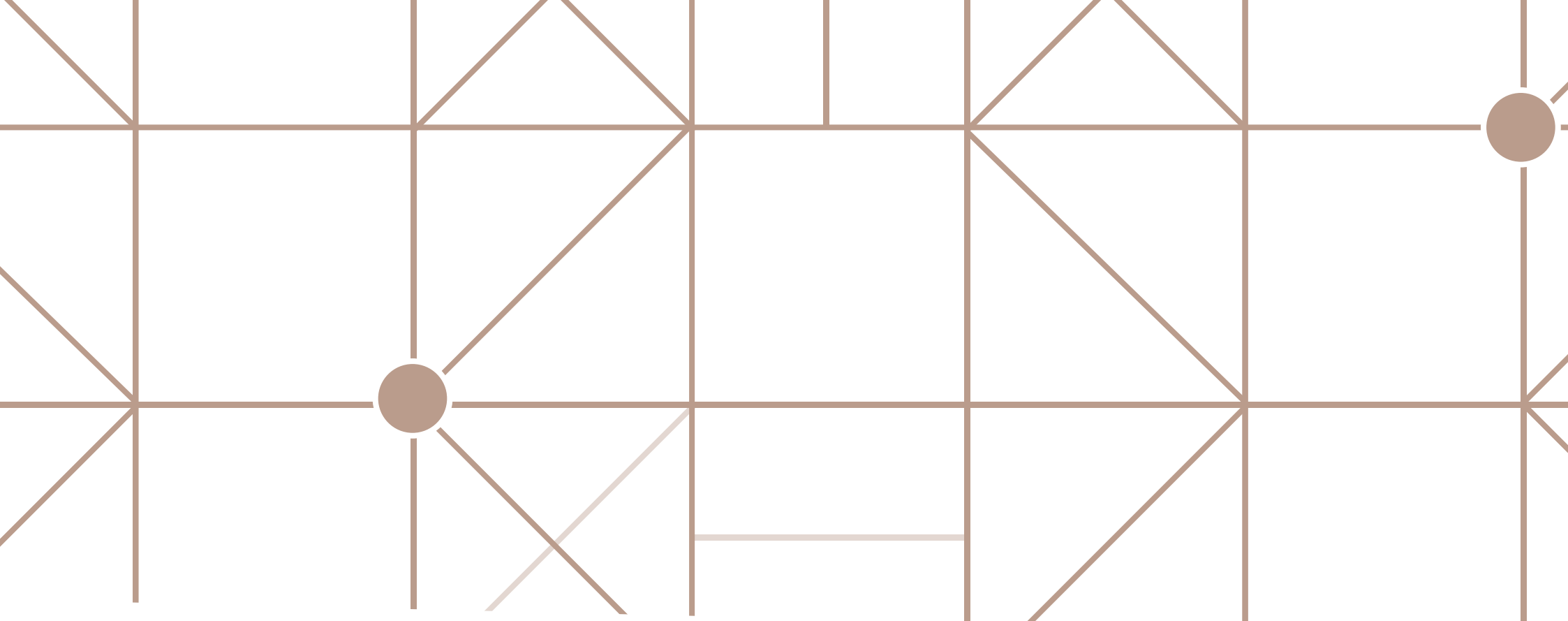
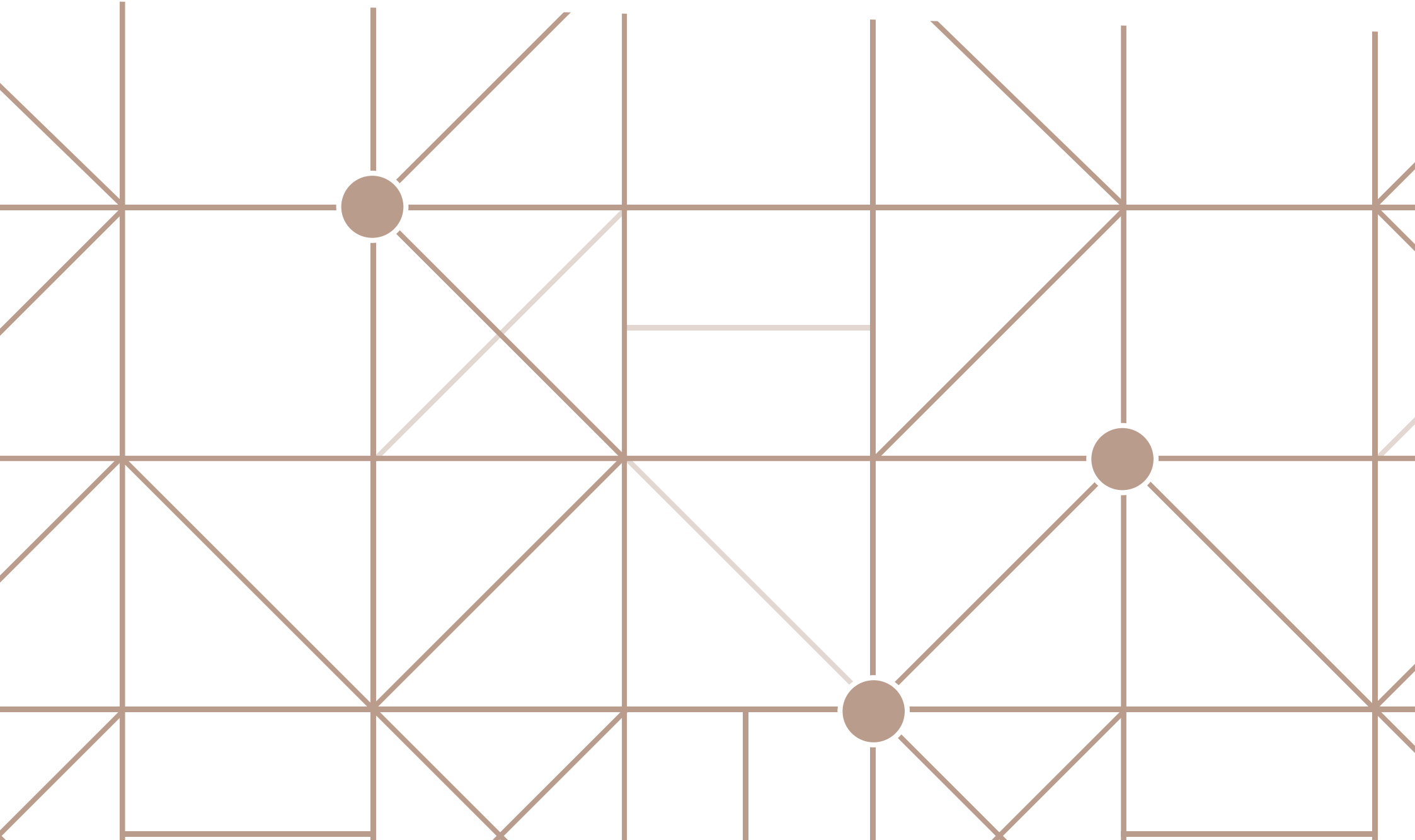




Ortho ScAQs



Volkman's ischaemia

- **Def:** Ischaemic injury to muscles & nerves of flexor compartment of forearm.
- **Etiology:** Occulsion of **Brachial artery** due to a supracondylar fracture.
- **Most commonly affected muscles:** Muscles supplied by **Anterior interosseus artery** (Br. of Brachial artery).
 - 1) Flexor pollicis longus
 - 2) Medial Half of Flexor digitorum profundus.
- **C/F:**
 - Severe pain in forearm (Ischaemic pain > pain due to fracture).
 - Inability to move fingers
 - Tenderness on pressing over forearm muscles.
 - **Stretch pain:** Pain in flexor compartment on passive stretching of fingers.
- **Rx:**
 - 1) Remove external splints and bandages that may be causing the constriction.
 - 2) Forearm is elevated and patient is encouraged to move fingers.
 - 3) If no improvement in 2 hours → **Urgent decompression of tight compartment.**
 - ↓
 - Done by **fasciotomy**
(Deep fascia covering flexor muscles slit along entire length).

✱ Leads to **compartment syndrome** of forearm

Sudeck's Osteodystrophy

(Reflex sympathetic dystrophy)

- Group of vague painful conditions observed as sequelae of trauma.
- Sometimes, trauma is relatively minor, and hence **symptoms and signs** are out of proportion.

- **C/F:**
 - 1) Pain
 - 2) Hyperaesthesia
 - 3) Tenderness
 - 4) Swelling
 - **Early stage:** Skin becomes **Red, shiny and warm**
 - **Late stage:** - **Progressive atrophy** of skin, muscles and nails.
- Joint deformity and stiffness.

- **Xray:** Spotty Rarefaction

Rx:

- 1) Prolonged physiotherapy (principle modality of Rx)
- 2) β - blockers have shown good response in some cases.
- 3) Sympathetic block may aid recovery in resistant cases.

- Rx is prolonged. Further trauma in form of operation or forceful mobilisation is detrimental. Patience on part of doctor and patient is usually rewarding.

Non Union

- When in a fracture, the union does not progress at all and bones fail to unite, it is called Non union. Conventionally, a fracture can't be declared non union before 6 months.

- Types:**
 - 1) Atrophic (minimal / No attempt of callus formation)
 - 2) Hypertrophic (callus present but does not bridge fracture site).

Causes:

Related to patient	Related to fracture	Related to treatment
1) Old age 2) Osteomalacia 3) Malignancy	1) Distraction at fracture site - muscle pulling fragments - gravity 2) Soft tissue interposition 3) Bone loss at time of fracture 4) Infection 5) Damage to blood supply of fracture fragments 6) Pathological fracture	1) Inadequate reduction 2) Inadequate mobilisation 3) Distraction during treatment

- C/F:**
 - Persistent pain
 - Deformity
 - Abnormal mobility at fracture site

- Dx:**
 - 1) Clinical findings
 - 2) Evaluation of Serial x-rays
 - detect subtle angulation
 - Non progress of bridging callus
 - Resorption of callus
 - 3) Oblique view done under fluoroscopy
 - 4) 3-D CT scan

- Mx:** Depends on site of non union & cause.
 - No Rx for asymptomatic non unions.

- Some methods of Rx:
 - 1) Open reduction, internal fixation and bone grafting
 - 2) Excision of fragments (may or may not be replaced by prosthesis)
 - 3) Ilizarov's method.

Malunion

- When fracture does not unite in proper position it is said to be malunited.

Causes:

- 1) Improper treatment
- 2) Unchecked muscle pull (Fracture of clavicle)
- 3) Excessive comminution (eg. Colle's fracture)

Consequences:

- 1) Deformity
- 2) Shortening of limb
- 3) Limitation of movement

Mx:

No Rx:

Sometimes malunion may not need any Rx.

- 1) Children (Better remodelling)
- 2) Angulation in plane of movement
- 3) Location of fracture

Rx Options:

- 1) Osteoclasis (Refracturing the bone)
 - ↳ for mild to moderate angular deformities in children.
- 2) Redoing the fracture surgically:
 - Fracture site exposed malunion corrected & fracture fixed internally with implants
 - Bone grafting is also performed in most cases.
- 3) Corrective osteotomy
- 4) Excision of protruding bone.

Nerve injury

● Classification: Seddon's Classification

Type of injury	Pathology	Degeneration	Neuroma	Prognosis
● Neurapraxia	- Physiological disruption of nerve conduction - Anatomically normal	Nil	Nil	Spontaneous recovery within 6 weeks
● Axonotmesis	Axons broken, nerves intact	Wallerian (Proximal + distal)	Neuroma in continuity	- Spontaneous recovery may occur - Takes months - Complete recovery may not occur
● Neurotmesis	Axons as well as nerves broken	Wallerian (Proximal + distal)	End neuroma or Side neuroma	- Spontaneous recovery not possible - Nerve repair required.

Mechanisms of Injury:

- 1) Direct - Cut, laceration
- 2) Infections
- 3) Mechanical - Compression, traction, friction
- 4) Cooling and freezing
- 5) Thermal injury
- 6) Electrical injury
- 7) Ischaemic injury
- 8) Toxic - Inj tetracycline → Radial n. palsy
- 9) Radiation

● Mx:

Conservative

- 1) Splintage of paralysed limb
- 2) Preserve mobility of joints
(Every joint of affected limb put through full range of motion once a day)
- 3) Care of skin & nails
- 4) Analgesics
- 5) Physiotherapy

● Operative Rx: Nerve Repair

- Primary: for clean sharp cut within 6-8 hours
- Delayed primary: Between 7-18 days after injury
- Secondary: After delay of 3-6 weeks for crushed avulsed injuries.

● Techniques of repair

- 1) Nerve Suture:
 - Epineural
 - Epi-perineural
 - Perineural
 - Group fascicular repair

2) Nerve grafting: When nerve gap > 10cm and end to end suture is likely to result in tension.

Radial nerve palsy

Median nerve palsy

Ulnar nerve palsy

Motor Branches:

- 1) Before radial groove: Triceps (long & media)
- 2) After radial groove: Tricep (lateral head)
Anconeus
Brachioradialis
Extensor carpi radialis longus
- 3) After elbow: Extensor carpi radialis brevis
Supinator
- 4) After piercing supinator: Extensors of forearm & hand.

- 1) In arm: None
- 2) Forearm: - Proximal $\frac{1}{3}$: Flexor muscles except those supp. by Ulnar n.
- Distal $\frac{1}{3}$: Nil
- 3) Hand: Thenar muscles - Flexor pollicis brevis
Opponens pollicis
Abductor pollicis
First two lumbricals.

- 1) Arm: None
- 2) Forearm:
• Proximal $\frac{1}{3}$: Flexor carpi Ulnaris
- medial $\frac{1}{2}$ Flexor digitorum profundus
• Distal $\frac{1}{3}$: None
- 3) Hand: Adductor pollicis
Hypothenar muscles
Medial two lumbricals
All interossei

Types:

- 1) Very High: All muscles paralysed.
- 2) High: Nerve injured at radial groove.
Triceps & Anconeus spare
- 3) Low: Injury around elbow.
- Muscles in distal arm (Brachioradialis, Extensor carpi radialis longus & brevis) spared.

- 1) High: Injury proximal to elbow.
Palsy of all supplied muscles in forearm.
- Sensory deficit in skin of hand
- 2) Low: Injury in distal third of forearm.
- Sparing of forearm muscles

- 1) High: Injury proximal to elbow.
Palsy of all supplied muscles in forearm.
- Sensory deficit in skin of hand
- 2) Low: Injury in distal third of forearm.
- Sparing of forearm muscles

Muscle to be examined:

- 1) Triceps
- 2) Brachioradialis
- 3) Wrist extensors: Palsy causes Wrist Drop
- 4) Extensor digitorus: Finger drop
- 5) Extensor pollicis longus

- 1) Flexor pollicis longus
- 2) Flexor digitorum superficialis
- 3) Lateral $\frac{1}{2}$ of flexor digitorum profundus
- 4) Flexor carpi radialis
- 5) Abductor pollicis - Pen test
- 6) Opponens pollicis

- 1) Flexor carpi ulnaris
- 2) Abductor digiti minimi
- 3) Dorsal interossei (Abductors): Egawa's test
- 4) Palmar interossei (Adductors): Card test
- 5) Lumbricals
- 6) Adductor pollicis: Book test → Froment's sign

Compartment Syndrome

- Limb contains muscles and nerves in compartments enclosed by bones and fascia. Compartment Syndrome is comprising of blood supply to nerves and muscles in a compartment due to increased pressure.

Aetiology:

- ① Reduced Compartment Size
 - Closure of fascial defects
 - Tight dressing/cast
 - External pressure

- ② ↑ed intracompartmental pressure:

- Bleeding (fracture, vascular injury, bleeding disorders)
- ↑ Capillary permeability (Ischaemia, Burns, trauma)
- Arterial embolus
- Post surgical

Common Sites:

- 1) Forearm - Volkmann's Ischemia
- 2) Carpal tunnel syndrome (Median Nerve)
- 3) Calf compartment
- 4) Ant. tibial Syndrome
- 5) Tarsal tunnel (Post tibial n.)

CIF:

- Pain
- Pallor
- Paresthesia
- Paralysis
- Pulselessness

Rx

- 1) Treat primary cause
- 2) Limb elevation and anti oedema measures
- 3) Decompression Surgery:
 - Fasciotomy
 - Fibulectomy: Excision of middle third of fibula decompresses all compartments of leg

Congenital Talipes Equino Varus

Aetiology

Idiopathic

- 1) Mechanical theory
(Raised intrauterine pressure forces foot against wall of uterus in position of deformity)
- 2) Ischaemia of calf muscles during intrauterine life
- 3) Genetic theory

Secondary

- 1) Paralytic disorders
- muscle imbalance → stronger invertors and plantar flexors lead to equino-varus deformity.
- 2) Arthrogryposis multiplex congenita

• CIF

- 1) Detected at birth
- 2) Brought during early infancy
- 3) Brought during late infancy/ early childhood
- 4) Brought during late childhood

Examination

- 1) Bil foot deformity (60%)
- 2) Foot in equinus, varus & adduction
- 3) Heel is small in size
- 4) Deep skin creases on back of heel
- 5) Bony prominences felt on lateral side of foot
- 6) Outer side of foot is gently convex.

• Dx:

- X rays - AP & lateral with foot in whatever corrected position possible.
- **Talo calcaneal angle (Kite's angle)** is reduced (Normally $>35^\circ$)

• Mx.

Non operative methods

- 1) Manipulation alone
- 2) manipulation + POP cast
 - ↳ Methods
 - a) Kite's philosophy
 - b) Ponsetti's philosophy

• Kite's philosophy: Start Rx at age of 1 month.

- Sequence of correction:
 - 1) Adduction
 - 2) Inversion
 - 3) Equinus
- Below knee plaster cast
- Casts changed every 2 weeks

Methods to maintain correction

- CTEV splints
- Dennis brown splints
- CTEV shoes
 - ↳ Straight inner borders (prevent adduction)
 - ↳ Outer shoe raise (prevent inversion)
 - ↳ No heel (prevent equinus)

Operative Methods:

- 1) Posteromedial soft tissue release (PMSTR)
- 2) Limited soft tissue release
- 3) Tendon transfer
(Tibialis anterior transfer to other side of foot)
- 4) Dwyer's osteotomy
- 5) Dilwyn Evan's procedure
(PMSTR + calcaneo cuboid fusion)
- 6) Wedge tarsectomy
- 7) Triple arthrodesis

• Ponsetti's philosophy: Used currently.

- Rx started within 1st week of life
- Thumb pressure put over talus Head → Cuboid navicular process externally rotated
- Sequence of correction:
 - ① Cavus
 - ② Adduction
 - ③ Varus
 - ④ Equinus
- Above knee POP cast after every manipulation
- Cast changed every 5-7 days.

Tb hip

• Stage 1: Stage of synovitis

- Effusion into the joint
- Attitude: flexion, abduction, external rotation
- Pelvis tilts downwards to compensate for abduction
- Stage of apparent lengthening

• Stage 2: Stage of arthritis

- Involvement of articular cartilage
- Spasm of powerful muscles around hip.
- Attitude: flexion, adduction, internal rotation
- Pelvis tilts upwards to compensate for adduction
- Stage of apparent shortening

• Stage 3: Stage of erosion:

- Cartilage is destroyed
- Head of acetabulum is eroded
- Attitude same as stage II
- There may be pathological dislocation / Subluxation of Hip
- Deformities are exaggerated
- True shortening because of actual destruction of bone.

Mx

- 1) General care (as TB spine)
- 2) Care of Hip
- 3) Operative Mx
 - (i) Joint debridement
 - (ii) Girdlestone arthroplasty
 - (iii) Arthrodesis
 - (iv) Corrective osteotomy
 - (v) Total Hip replacement

Frozen shoulder

- A condition in which gleno-humeral joint becomes painful and stiff because of loss of resilience of joint capsule, possibly with adhesions between its folds.
- Aetiology: Unknown
 - Risk factors: Diabetes
H/O preceding trauma
- C/F:
 - Early: Pain, worst at night
Stiffness limited to abduction & internal rotation
 - Late: Pain present all the time
All movements severely limited
- Mx:
 - The disease is usually self-limiting; lasts for 6-9 months.
 - Analgesics
 - Hot fomentation
 - Physiotherapy & mobilising exercises
 - Intra-articular injection of hydrocortisone may speed up recovery.

Anterior Shoulder dislocation

- Mechanism:
 - 1) Fall on outstretched hand with shoulder abducted and externally rotated.
 - 2) Direct force pushing humerus out of glenoid cavity.
- Injury: The head of humerus comes out of glenoid cavity and lies anteriorly.
- Types:
 - ① Preglenoid: Head lies in front of glenoid.
 - ② Subcoracoid: Head lies below coracoid process (most common).
 - ③ Subclavicular
- C/F: Shoulder abducted and elbow supported with other hand.
- Examination:
 - ① Duga's test: Inability to touch opposite shoulder.
 - ② Hamilton ruler test: It is possible to keep a ruler on lateral side of arm due to flattening of shoulder. This touches acromion and lateral condyle of humerus simultaneously.
- Xray: Diagnosis can be confirmed on AP view. Axillary view may be required sometimes.
- Rx:

- ① Reduction under sedation or general anaesthesia
- ② Immobilisation in chest arm bandage x 3 weeks
- ③ Shoulder exercises after bandage is removed

Complications:

Early

- ① Associated fracture of greater tuberosity
 - ↳ Needs no Rx
 - ↳ Usually comes back in position when head is reduced.
- ② Injury to axillary nerve
 - ↳ Paralysis of Deltoid
 - ↳ Small area of anaesthesia over lateral aspect of shoulder

Late

- Recurrent Dislocations
 - ↳ Causes:
 - (i) Anatomically unstable joint (Marfan's Syndrome)
 - (ii) Inadequate healing after 1st dislocation

Techniques of Reduction:

• Kocher's Manoeuvre:

(M/C used method)

- ① Traction - with elbow fixed to right angle
- ② External Rotation
- ③ Adduction
- ④ Internal Rotation

• Hippocrates manoeuvre:

- ① Surgeon applies firm steady pull on semi abducted arm
- ② He keeps his foot in axilla against chest wall.
- ③ Head of humerus is levered back in position using foot as fulcrum.

Tennis elbow

- Lateral Epicondylitis
- CIF
 - Pain and tenderness localised to lateral epicondyle of Humerus at origin of extensor muscles of Forearm.
 - Pain aggravated by putting extensor tendons to a stretch.
 - X ray reveals no abnormality
- Rx.
 - ① Analgesics, NSAIDs for a week or 2.
 - ② Local injection of Hydrocortisone at point of maximum tenderness.

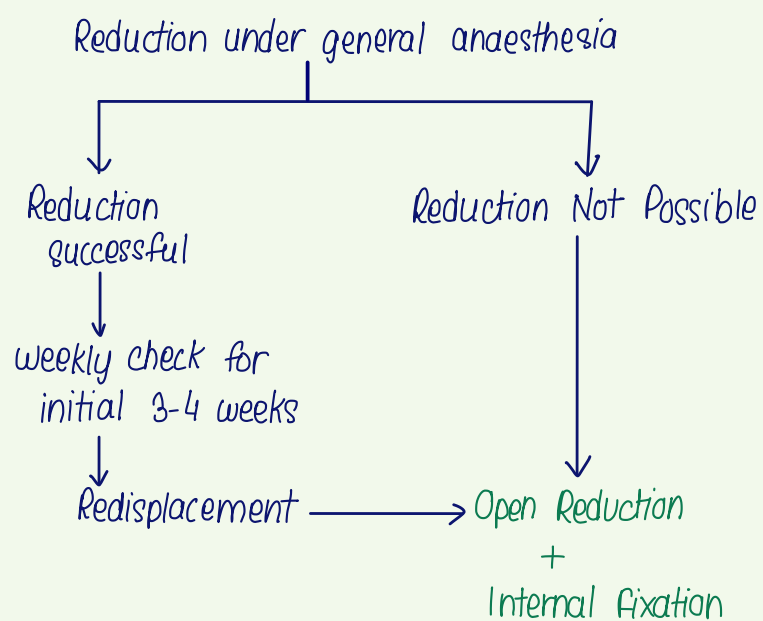
Golfer's elbow

- Medial epicondylitis
- CIF
 - Pain and tenderness localised to medial epicondyle of Humerus at origin of flexor muscles of Forearm.
 - X ray reveals no abnormality
- Rx.
 - ① Analgesics, NSAIDs for a week or 2.
 - ② Local injection of Hydrocortisone at point of maximum tenderness.

Monteggia Fracture dislocation

- Fracture of Upper third of Ulna with dislocation of Head of Radius.
- Mechanisms:
 - ① Fall on outstretched hand.
 - ② Direct blow on back of upper forearm.
- Types:
 - ① Extension type: Fracture angulates and Radial head displaces anteriorly. (more common)
 - ② Flexion type: Fracture angulates and radial head displaces posteriorly.
- CIF:
 - ① Pain
 - ② Swelling
 - ③ Tenderness
- Dx: X ray AP and lateral view.
- Mx:

Very unstable injury.



- Radial Head automatically falls into place when ulna fracture is reduced.

Complications:

- ① Redisplacement
- ② Malunion
- ③ Deformity of forearm
- ④ Limitation of elbow & forearm movements

Fracture Scaphoid

- Types: ① Crack fracture
② Displaced fracture

Location: ① fracture through waist of scaphoid (more common).
② fracture through tuberosity

Clf

- More common in young adults
- Pain & swelling over radial aspect of wrist following a fall on outstretched hand.
- Tenderness in scaphoid fossa.

Scaphoid Cast

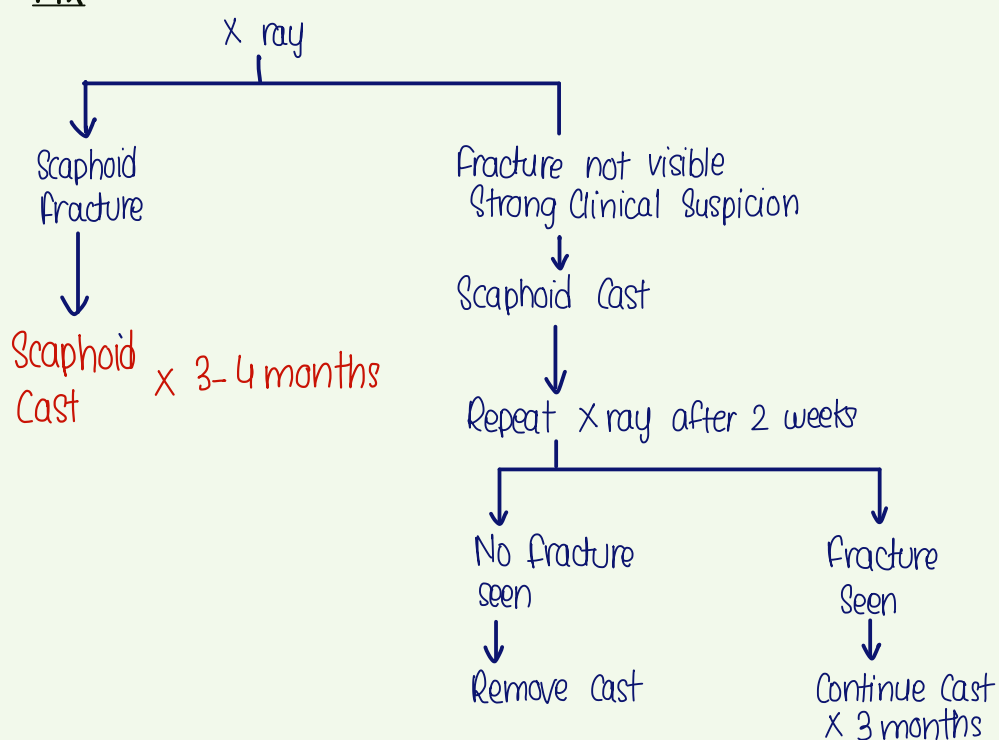
- Cast extending from below elbow to metacarpal heads
- Includes thumb up to **Interphalangeal joint**
- Wrist maintained in **Little Dorsiflexion & Radial Deviation**

- Dx: X ray wrist - AP, lateral and **Oblique** view.

* Crack fractures are sometimes not visible on initial x rays.

↓
Repeat x ray after 2 weeks. (**Fracture visible due to resorption of fracture ends**)

• Mx:



- Widely displaced fractures:

Open Reduction + Internal Fixation (Herbert's screw)

Complications:

- ① Avascular Necrosis of Proximal fragment.
- ② Delayed union and Non union
- ③ Wrist osteoarthritis

Pelvic fractures complications

① Rupture of urethra:

- Signs - (i) Blood per urethra
(ii) Perineal haematoma
(iii) Distended bladder

Rx:

- (i) Drainage of bladder by suprapubic cystostomy
- (ii) Assess severity using micturating cystourethrogram after 6 weeks & manage accordingly of stricture

② Rupture of Bladder:

- Dx - Suspect if patient has not passed urine for long time after fracture
- Dx by cystourethrogram

- Rx - ① Drain urine in prevesical space.
② Drainage & repair of bladder

③ Injury to rectum or vagina

④ Injury to nerves: Nerves of Lumbosacral Plexus

⑤ Injury to major vessels (**Common iliac artery**) - Rare but serious complication.

⑥ Rupture of diaphragm with severely displaced fractures.

↳ X ray to confirm if patient complains of breathing difficulty following pelvic fracture

↳ **Rx: Surgical Repair**

Amputation

Indications:

- ① Injury
- ② Peripheral vascular disease
- ③ Diabetes
- ④ Infections (eg - Gas gangrene)
- ⑤ Tumors
- ⑥ Nerve injuries
- ⑦ Congenital anomalies

Types:

- ① Open / Guillotine: Skin is not closed over amputation stump.
Usually done when wound is not healthy

- operation is followed by one of following procedures after some period for a satisfactory stump:
 - ① Secondary Closure
 - ② Plastic repair
 - ③ Revision of stump
 - ④ Re amputation

- ② Closed Amputation: Skin over the amputation stump is closed primarily.
- most elective procedures are closed amputations.

Table-40.2: Nomenclature of amputation by levels

Name	Part of the limb removed
Upper limb	
• Forequarter amputation	Scapula + lateral $\frac{2}{3}$ of clavicle + whole of the upper limb
• Shoulder disarticulation	Removal through the gleno-humeral joint
• Above elbow amputation	Through the arm
• Elbow disarticulation	Through the elbow
• Below elbow amputation	Through the forearm bones
• Wrist disarticulation	Through the radio-carpal joint
• Ray amputation	Removal of a finger with respective metacarpal from carpo-metacarpal joint
• Krukenburg's amputation	Making 'forceps' with two forearm bones
Lower limb	
• Hindquarter amputation	Whole of the lower limb with one side of the ilium removed
• Hip disarticulation	Through the hip
• Above knee amputation	Through the femur
• Knee disarticulation	Through the knee
• Below knee amputation	Through the tibia-fibula
• Syme's amputation	Through the ankle joint
• Chopart's amputation	Through talo-navicular joint
• Lisfranc's amputation	Through inter-tarsal joints

Rickets

Types:

Type I : ① Due to deficiency of Vitamin D
② Due to disturbance in vitamin D metabolism

Type II : ① Defective absorption of phosphates through renal tubule
② Diminished intake or absorption of phosphates

C/F:

- ① Craniotabes : Seen in young infants
Pressure over soft membranous bones of skull give feeling of ping pong ball compressed and released.
- ② Bossing of frontal and parietal bone (Evident after 6 months).
- ③ Broadening of ends of long bones (most prominent around wrist and knees)
- ④ Delayed teeth eruption.
- ⑤ Harrison's Sulcus : A horizontal depression along lower part of chest corresponding to insertion of diaphragm.
- ⑥ Pigeon chest : Sternum is prominent
- ⑦ Rachitic Rosary : Costochondral junctions on anterior chest wall become prominent.
- ⑧ Muscular Hypotonia : Abdomen becomes protuberant (Pot belly).
- ⑨ Deformities : Bow legs, Knock knees.

Radiological Features:

- ① Delayed appearance of epiphyses.
- ② Widening of epiphyseal plates
- ③ Cupping of metaphysis
- ④ Splaying of metaphysis
- ⑤ Rarefaction of diaphysial cortex (occurs late)
- ⑥ Bone deformities : Knock knees, Bow legs, Coxa vara.

Rx:

- Medical: Vitamin D 600,000 IU single oral dose
Maintenance dose : 400 IU/day if child responds to vitamin D therapy
- Orthopaedic:
 - Mild deformities correct spontaneously as rickets heals.
 - Mermaid splints, orthopaedic shoes for knee deformities may be used.
 - Operative methods: For moderate to severe deformities.
 - ↳ done after 6 months of starting medical therapy.

Bone tumors

- a) **Bone forming tumours**
 - Benign:
 - Osteoid osteoma, osteoma
 - Osteblastoma
 - Indeterminate
 - Aggressive osteoblastoma
 - Malignant
 - Osteosarcoma conventional, variants
- b) **Cartilage forming tumours**
 - Benign:
 - Osteochondroma (exostosis)
 - Enchondroma (chondroma)
 - Chondromyxoid fibroma
 - Chondroblastoma
 - Malignant:
 - Chondrosarcoma
- c) **Giant cell tumours (GCT)**
 - Benign GCT
 - Indeterminate GCT
 - Malignant GCT
- d) **Marrow tumours**
 - Malignant:
 - Ewing's sarcoma
 - Plasma cell tumour
 - Multiple myeloma
 - Lymphoma
- e) **Vascular tumours**
 - Benign:
 - Haemangioma
 - Glomangioma
 - Malignant:
 - Angiosarcoma
- f) **Others**
 - Benign:
 - Neurilemmoma
 - Neurofibroma
 - Malignant:
 - Malignant fibrous histiocytoma
 - Liposarcoma
 - Undifferentiated sarcoma
 - Adamantinoma
- g) **Tumour-like lesions**
 - Bone cysts – simple or aneurysmal
 - Fibrous dysplasia – mono or polyostotic
 - Reparative giant cell granuloma (e.g. epulis)
 - Fibrous cortical defect
 - Eosinophilic granuloma

TABLE 43.1: Differences between benign and malignant tumors

Benign tumors	Malignant tumors
• Slow growing	• Rapidly growing
• Well circumscribed	• Not well circumscribed
• Non-invading	• Invading
• No or few symptoms	• Associated with pain and disability
• Does not metastasise	• Metastasises
• X-ray shows lesions bone	• X-ray shows ill-defined borders, mottled appearance, cortex may be broken
• Does not cause death of the patient	• May cause death of the patient

Osteoid osteoma

- Commonest true benign tumor of bone
- **Pathology**: It consists of nidus of tangled arrays of partially mineralised osteoid trabeculae surrounded by dense sclerotic tissue.
- **CIF**: Age : 5-25 years
Location : Diaphysis of long bone (M/C Tibia).
 - Nagging pain , worse at night.
 - mild tenderness at site of lesion
 - Palpable Swelling in case of superficial lesion.
- **Dx**: X ray – Zone of sclerosis surrounding radiolucent nidus
CT – If nidus not visible on X ray.
- **Mx**: Complete excision of Nidus along with sclerotic bone.

Osteochondroma

Commonest benign tumor of bone (Not a true neoplasm as its growth stops with cessation of growth at epiphyseal plate).

- Result of aberration at growth plate → few cells of plate grow centrifugally as a separate lump of bone.

CIF

- Usually seen in adolescence
- Painless swelling around a joint (usually knee)
- There may be similar swellings in other parts of body (Multiple Exostosis).

Signs suggestive of complications:

- ① Pain – due of bursitis at tip of swelling
or
fracture of exostosis
- ② Signs due to compression of neurovascular bundle of limb.
- ③ Limitations of joint movements (due to mechanical block by swelling)

Dx: X-ray (AP & lateral)

- Bony growth made up of mature cortical bone & marrow
- Cartilage cap is not visible on x ray

Mx:

Excision of tumor
(Excision includes periosteum over exostosis)

Osteoclastoma

- Also known as giant cell tumor

Sites: Tumor is located in epiphysis of long bones.

- Lower end of femur
- Upper end of tibia
- Lower end of radius.

C/F:

- Seen after epiphyseal fusion (20-40 years)
- Swelling
- Vague pain
- Pathological fracture

Examination:

- Bony swelling eccentrically located at end of the bone.
- Surface of swelling is smooth
- Characteristic **egg-shell cracking** is often not elicited.
- Deformity (if pathological fracture has occurred)

Radiological Findings:

- ① Solitary, loculated, lytic lesion
- ② Expansion of overlying cortex (Expansile lesion)
- ③ **Soap Bubble appearance**:
 - Tumor is homogeneously lytic with trabeculae of remnants of bone transversing it.
- ④ No calcification within the tumor
- ⑤ No/minimal reactive sclerosis around tumor
- ⑥ Cortex thinned out/perforated at places.
- ⑦ Tumor usually does not enter adjacent joint.

• Mx

- ① Excision - Rx of choice
- ② Excision with reconstruction
 - Arthrodesis by Tum-o-Plasty procedure
 - Arthroplasty
- ③ Curettage with /without supplementary procedures (Cryotherapy)
- ④ Amputation - for aggressive tumors
- ⑤ Radiotherapy - for tumors affecting vertebrae.

Osteosarcoma

• Radiological Findings:

- ① An area of **irregular destruction in metaphysis**
 - Cortex overlying the lesion is eroded
 - There is new bone formation in matrix of tumor.
- ② **Periosteal Reaction**: Periosteal Rxn in Osteosarcoma is **irregular** unlike in osteomyelitis (smooth & in layers)
- ③ **Codman's triangle**: A triangular area of subperiosteal new bone at tumor-host cortex junction at ends of tumor.
- ④ **Sun Ray appearance**: Periosteum is unable to contain the tumor

↓
Tumor grows into overlying soft tissue
↓
New bone is laid down along blood vessels within the tumor growing centrifugally
↓
Sun Ray appearance on X ray.