# ORTHOPEDIC

Handwritten Note

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Name: _________________________________________

Subject: ___________________ Orthopedic ___________________
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HISTORY

1) GALEN  "Father of Sports Medicine"

2) NICHOLAS ANDREY
   
   coined the term Orthopaedics
   
   wrote 1st book —
   
   Father of Orthopaedics
   
   Crooked Tree symbol of Ortho

3) JEAN ANDRÉ VENEL
   
   Father of Orthopaedics

4) HUGH OWEN THOMAS
   
   Father of British orthopaedics
   
   Thomas splint was made for TB knee
   
   was used for # soft
   
   Thomas collar — soft cervical collar
   
   Thomas wrench — # reduce
   
   Thomas Test — flexion deformity @ Hip

5) PELVIC POT
   
   Poth's # — Bimalleolar # (MM + LV)
   
   Poth's Spine — TB - j spine

6) JAMES VAUET
   
   Paget's Disease of Bone
   
   Fracture Disease

7) ROBERT JONES
   
   Father of modern Orthopaedics
   
   Jones # - Robert Jones Bandage
ALBIN LAMBOTTE
Father of modern internal fixation
Coined the term 'osteosynthesis'
Described the usage of biodegradable implant

LORENTZ BOHLER
Father of Traumatology
Bohler's Brownt splint
Bohler's Angle
Bohler's Stirrup - skeletal traction

GERHARDT KUNTCHNER
Kuntchner nail

MARTIN KIRSCHNER
Kirschner wire

MAURICE E. MILLER
Co-founded AO - Arbeitsgemeinschaft
Fur Osteosynthesefragen

ARAHAM COLLES
Collis #

JOSEPH LISTER
Father of Antiseptic Surgery

AMBROISE PARE
Father of Amputation surgery

UTG MORTON
Father of modern anaesthesia

W.C. ROENTGEN - discovered X-ray 5th World Radiology Day
Father of Radiology on 8th Nov, 1895
ENNEKING
  Father of orthopaedic oncology

John Charnley
  Father of arthroplasty
  hip
  joint

INSEAL
  NORMAN W. SCOTT → Total Knee Replacement
  KELLY

MASAKI WATANBE
  Father of modern arthroscopy

JOHN BARTON
  Barton's #
  Barton's Disease - (vit C = scurvy
  vit D = rickets

KENJI TAKAJI
  Father of arthroscopy

CAFFEY
  Caffey's Syndrome - Battered Baby Syndrome
  Caffey's Disease - Infantile Cortical Hyperostosis
  L. H. Bone - Mandible

GAHRILL ABRAMOVICH ILIZAROV
  Dútman: Histogenesis

Dr. B. B. Joshi
  JESS - Joshi's Ext. Stabilising System

Dr. S. M. Tuli
  Muculocrletal TB

Dr. P. K. Sethi
  Jaipur Foot
DAYS

Bone & Joint Day - 4th Aug
World Spine Day - 16th Oct
World Arthritis Day - 12th Oct
World Radiology Day - 8th Nov
World Clubfoot Day - 3rd June

SPINE

ANATOMY

DENNIS 3 COLUMN CONCEPT OF SPINAL STABILITY

ANT
1) Ant. longitudinal ligament (ALL)
2) Ant 2/3 of V. Body
3) Ant 2/3 of I.V. Disc

MIDDLE
1) Post 1/3 rd of V. Body
2) Post 1/3 rd of I.V. Disc
3) Post- longitudinal ligament (PLL)

POST
1) Post longitudinal lig. complex
2) NEURAL ARCH
   Pedicle
   Transverse process
   Sup. articular process
   Infr. articular process
   Laminal
   Spinous process
LIST - ① - TERMS IN SPINE

Spondylitis → Paraspinal M/c Spasm
Spondylolysis → # of pedicle/ Pars Interarticularis
Spondylolisthesis → step slippage of 1 v. Body over another v. Body

LIST - ② M/c In SPINE

→ M/c Mode of Spinal Trauma
  Developing nation
  Fall from height   RTA
  FFH

Developed nation

→ M/c mechanism of Spinal Trauma
  Flexion distraction > Flexion

→ Worst mechanism of Spinal Trauma
  Translation > Flexion rotation

→ Spinal canal: Widest at C2 level

→ VERTEBRAE - always constant in no. → Cervical
  Most variable in no → Coccygeal

M/c Site of

Spinal Trauma → Cervical Spine
Spinal # → Lower Thoracic Spine
Spinal cord injury → Cervical Spine
Peripheral N/V injury → Radial N/V (PNT)
PNI → BEST prog. → Radial N/V
PIST → worst. → ULNAR N/V
PNT & WORST PROGNOSIS = SCITATIC N/V
(despite surgical repair)

M/c site of skull bone # = TEMPORAL
M/c site of facial bone # = NASAL > ZYGOMATIC
M/c site of mandible # = Neck of condyle

LIST-4 #1: Injuries of spine & Leoponyms

JEFFERSON'S #
Burst # of C1 Hing (atlas)
Involves Ant. & Post Hing
85% # no neurological defect
Undisplaced # -> collar
displaced # -> HALO VEST

HANGMAN’S #
Mech: Hyperextension followed by distraction
Spondyloysis (# of pars interarticularis/pedicle)
of C2 (axis) & Spondylolisthesis of C2 over C3.
C2-C3 I.V. Disc disruption.

CLAY SHOVELLER’S #
avulsion # of tip of spinous process of C7 > T1
seen in the labourers who do heavy work
left leg in arms extended
CHANCE #/ SEAT BELT INJURY/ JACK KNIFE INJURY

Head on collision of during seat belt RTA
Mech: Flexion — Distracton — Rotation.
Horizontal # Line Traversing the vertebral Body through all three columns.

Level — T12-L2

50% pt — concomitant intraabdominal injury

UNDERTAKER #.

Post Mortem findings due to careless handling of dead Body by undertaker Q.

# subluxation of lower cervical spine 100-20 I.V. disc disruption/tear.

SCIWORA # (PQI)

spinal cord injury 1out radiological Ab

children <8 yrs

Initial X-Rays —

Presentation — Neurodeficit

No Spinal Reflexes

IOC: MRI

Upper cervical spine
NEUROGENIC SHOCK/ SPINAL SHOCK

young 0°

RTA.

Unconsciousness

Hypotension.

Bradycardia → Hallmark

H/o site of spinal cord injury → Lower C. spine

COMPLETE

INCOMPLETE

Θ Sacral sparing

Θ Perineal sensations

Θ Flexor Hallucis Longus

Θ Rectal motor tone

Θ Bulbocavernous Reflex/ Anal wink

(First reflex to disappear
1st reflex to reappear
in pt. of spinal shock)

T0 c - MRI.
PAEDIATRIC SPINE

KLIPPED FIEG SYNDROME (AIIIM)

Dystrophia Beuvicollis Congenita
Bony pathology / segmentation failure
Congenital fusion of cervical vertebrae
Child

Short webbed neck

Triad of KFS

1. Low post naveline
2. Restriction of movements of neck
3. Short stature of child

H/c association → Spengel’s deformity

Other associations:

Congenital heart defect
Ocular anomalies
Glut Mb

Mx to prevent complications
Cervicothoracic scoliosis

Avoid collision sports

CONGENITAL MUSCULAR TORTICOLLIS (CMT)/WRY NECK

Muscular pathology

Overgrowth of sternocleidomastoid (SCM)
Fibromatosis of SCM

Palpable neck mass ☑ in 4-6 wks after birth

Association:

Developmental dysequia of hip
Metatarsus Adductus
contralateral SCM @ junct. of U 2/3 - L 1/3

R side > L side.

90-95% pts - Regular stretching exercise.
5-10% pts - Surgical release of muscle
          only after swelling/mass persists
          > 1 year of age.

For cephalic injury - Injure SCM.

Complications - n/1 Head tilt
               1/2 Chin left deformity
               (cock robin deformity)

2) PLACIOCEPHALY
   (asymmetrical development of
    skull & face).

III IDIOPATHIC ADOLESCENT SCOLIOSIS

θ > 5°

around puberty

Double curve

Thoracolumbar

Single curve

Thoracic  Lumbar
Spine     Spine

L/H)

R > L

Double curve progresses earlier than single
curve.
COBB’S ANGLE

< 30° → unlikely to progress
30°–55° → 10–15° progression
> 55° → progress @ 1°/year

3% → Scoliotic Deformity
  L < less than 10% of population. — Requires Rx.

→ SPONDYLOLISTHESIS
Slippage on 1 vertebra over another vertebra
H/L Level ≤ L5 S1 > L4 5
H/L N/V Root Irritated: L5

TYPES OF SPONDYLOLISTHESIS

A) Isthmic/Lytic
H/L type
Defect in Pars Interarticularis
Congenitally weak pars interarticularis
Luma sports → Fatigue
Activity # of pars

B) Dysplastic
Rare, congenital type
No defect / No # in pars
Defect in formation of 1st sacral arch, superior facets of S1
Neurodefect is more in this type compared to
Isthmic type
As there is growth spurt (14 year old, 16 year old)
LISTHETIC CRISIS

Acute onset of sudden pain & rigidity in paraspinale h/s & functional / kyphotic scoliosis

C) DEGENERATIVE

2nd H/o type > Isthmic
H/o Level L4 L5

اق > 50yrs

Senility → disc degeneration → Facet Injury
Osteoarthrosis / 2° Osteoarthrosis

stepped ← facet joint →

(usually low unstable)

D) TRAUMATIC

# in an area other than pars → slip.

E) PATHOLOGICAL

Generalised / # of pars interarticularis
Localised Bone pathology

⇒ Clinical Spectrum

Asymptomatic initially
Incidental Δ
1st Symptom → Back ache

Radiculopathy
Spasm on passive stretching of lage
Δ

X-ray: Oblique view of L5-S1 spine
defect in pars interarticularis

Break in neck of Scotty Terrier Dog Shadow

Beheaded Scotty Terrier Sign/
Scotty Dog Wearing a Collar Sign

(Scotty dog terrier shadow is a Qi feeding in
oblique x-rays of L5-S1 spine)

AP view - Inverted Napoleon Hat sign
(least useful) (due to superimposition of sacrum + LS)

Flexion & extension views - to see spinal stability

Mx of spondylolisthesis:
Based on Meyerding’s classification/staging
(AP diameter of sup. surface of lower vertebral to
vertebral body is divided into quarters)

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Treatment</th>
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<tr>
<td>I</td>
<td>&lt;25%</td>
<td>Conservative</td>
</tr>
<tr>
<td>II</td>
<td>25-50%</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>50-75%</td>
<td>Surgical when there is</td>
</tr>
<tr>
<td>IV</td>
<td>&gt;75%</td>
<td>a) progressive neurological defect</td>
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<td></td>
<td></td>
<td>b) canal stenosis</td>
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<td></td>
<td>c) refractory pain</td>
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LIST - 5  MYOTOMES

C5 - Deltoid
C6 - Wrist Extensors
C7 - Wrist Flexors / Elbow Flexors
C8 - Finger Flexors
T1 - Finger Abductors
L3 - Hip Flexors (Gluteus)
L3 - Knee Extensor (Quadriceps)
L4 - Ankle Dorsiflexors (Tibialis Ant)
L5 - Extensor Hallucis Longus
S1 - Ankle Plantar Flexors (Gastro Soleus)

LIST - 6  REFLEXES

C5 - Biceps
C6 - Supinator (Brachioradialis)
C7 - Triceps
L3 L4 - Knee Reflex (Quadriceps)
L5 S1 - Plantar Reflex (Femoral)
S1 S2 - Ankle Reflex (Gastro Soleus)
LIST 7  

DERMATOMES

Thumb
Index finger
Middle finger
Ring finger
Little finger

C3
C4
C5
C6
C7

Grain

L1
Ant. thigh

L2
Ant. knee

L3

L5

L4
Medial leg

Medial ankle

S1 - Lateral ankle

" foot
PROLAPSE INTERVERTEBRAL DISC

M/L LEVEL - L4-L5 > L5-S1 > S1-L2 > L6-S1

MRI BASED STAGING
I → Disc Degeneration/Disc Bulge
II → Disc Protrusion
III → Disc Herniation/Extrusion
IV → Disc Sequestration.

SCHMORL'S NODE
TYPES OF PIVD - Depending upon the degree of prolapse:

**Posterolateral/Paracentral**
- Lower level of N/V root

**Far Lateral/Foraminal**
- Upper level of N/V root

CLINICAL TESTS
1. Straight Leg Test
2. Braggards sign
3. Lasègue sign
4. Bowstring sign of McNab

**IMAGING**
- **MRT**
- **MRI**

**TREATMENT**
- Conservative
- Bed Rest
- NSAIDS
- Muscle Relaxant
- Intermittent Lumbar Traction
- Superficial Heat
  - Hot packs
  - Infrared therapy
- Deep Heat
  - Short wave diathermy
  - Ultrasound therapy
- TENS for radicular pain
  - Transcutaneous electrical nerve stimulation
Lumbar Belt/Corsets
Epidural steroids
Spine extension exercise

Indications for sx

Absolute

Relative

1) Progressive neurologic deficit
2) Cauda equina syndrome
   a) If established
      Sx should be done
      in 6 hours or
      irreversible damage
      occurs

Surgeon - Decompression + DISCECTOMY

Surgical Approaches: ASHMS May 2015
- Laminectomy
- Hemilaminectomy
- Laminotomy (facilitates sx) of choice - via microscope

LAMINOPLASTY - was done in cervical canal stenosis

1) Severe sciatica pain despite 6 weeks of conservative &
2) Recurrent incapacitating sciatica attacks.
   (> 3 per year)
**LIST - B**  
Flag Signs of Backache (NIMHs 21, 2015)

**RED**
1. Age <20 yrs
2. Age >50 yrs
3. Cachexia
4. Constant pain
5. Saddle anaesthesia
6. H/o malignancy/steroid use/ IV drug abuse

**YELLOW**
1. Anhedonia
2. Low mood
3. Poor job satisfaction
4. High functional limitation
5. Psychological disturbance
6. Social alienation/isolation
7. Alcohol dependence

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**PERIPHERAL NERVE INJURY**

- **SEDOM**'s CLASSIFICATION

  - **NEUROPRAXIA**
    - Physiological conduction block
    - Anatomy
      - Axon
      - N/v sheath
    - Transient demyelination

  - **AXONOTOMESIS**
    - Partial anatomical conduction block
    - Axonal disruption
      - Sheath
      - Surgery

  - **NEUROTOMESIS**
    - Complete anatomical conduction block
      - Axon + sheath disrupted
      - Surgery or compensation

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Website: http://mbbshelp.com  
WhatsApp: http://mbbshelp.com/whatsapp
Spontaneous recovery is a rule. S6wki

E.g. postural/positional
N/V palsy
Traumatic
Saturday night palsy

Rx - Dynamic cock-up splint
is done in Rx to avoid
croutessential deformities
Later

BAASTRUP’s DISEASE/KISSING SPINES

→ Degenerative Disease

→ Hypertrophy, enlargement of adjacent spinous process in lumbar spine in elderly pt.

→ Focal MIDLINE Backpain which worsens in
→ Extension

→ My Level- L4-L5

Rx - Conservative
LIST - 9

**Compression Neuropathy**

- Carpal Tunnel syn - Median N/V & Wrist
- Guyon’s canal syn - Ulnar n/v & Wrist (pit - pisohamate canal)
- Cubital tunnel syn - Ulnar n/v behind medial epicondyle
- Radial Tunnel syn - Post. Int. N/V (motor Br.)
- Pronator syn - Median N/V between two head of pronator Teres
- Kiloh Nevin syn - Ant. Int. N/V (motor Br. of median N/V)
- Piriformis syn - Sits is N/V compression
- Meralgia paraesthesia - Lateral cut. N/V of thigh
- Cheralgia paraesthesia - Sup. Sensory Br. of Radial N/V
- Morton’s Metatarsalgia - Interdigital plantar N/V compression
  - Excruciating pain on squatting

**NOTALGIA PARAESTHETICA** - Sup. Sensory neuropathy & infrascapular area.
- Parasthesia + Dysesthesia
- Rx - Pregabalin
MEDIAN NERVE

\[ \text{Median Nerve Split} \]

Superficial Br. \\
\[ \text{Palmar Cutaneous Br.} \]
\[ \text{Skin over thenar eminence} \]

\[ \text{Deep Br.} \]

\[ \text{Carpal Tunnel} \]

Lateral Division

Motor

1) Abductor pollicis brevis
2) Flexor pollicis brevis (superficial head)
3) Opponens pollicis
4) 1st Lumbrical

Sensory

Median Division

Sensory

1) Medial IF
2) MF
3) Lateral IF

Motor

2nd Lumbrical

Thumb lateral half (IF)
OSTEON

ORGANIC
(30-35%)

INORGANIC
(65-70%)

MATRIX
(90-95%)

CELLS
(5-10%)

MINERALS

Ca²⁺

PO₄⁻²

Calcium hydroxyapatite

PROTEINS

CP → Type I collagen

NCP → osteocalcin/Bone GlA protein

Osteonectin

Osteopontin

Enzyme - Alkaline Phosphatase

&

OSTEOBLASTS

CP

NCP

ALP

OSTEOID

Ca²⁺

PO₄⁻²

OSTEON

OSTEOCYTES

Resting/slowly/ripening

Quiescent osteoblast

OSTEOCLASTS

Giant cell family

Monocyte-macrophage cell lineage

ReModeling

Resorption of bone

2R's

Haversian Laciniae
**PHYSIOLOGY**

**CALCITONIN**

\[ \downarrow S.\text{Ca}^{2+} \]

**PTH**

\[ \overset{\text{Osteoclast}}{\text{Osteoblast}} \]

(RANK-L)

\[ \overset{\text{Osteoclast}}{\text{Bone Resorption}} \]

\[ \rightarrow \uparrow S.\text{Ca}^{2+} \]

**ANATOMY**

Long Bone has 4 Layers

- Epiphysis
- Physi/o growth plate
- Metaphysis
- Diaphysis

**EPiphyses**

**CLASSIFICATION**

1) PRESSURE - Body wt bearing
   - e.g. Head of femur

2) TRACTION - Attachment to soft tissue
   - e.g. Tuberosities (humerus)
   - Trochanter (femur)

3) ATAVISTIC - e.g. Coracoid process
ABERRANT

Eq. epiphysis @ Head of 1st Me.

PHYSIS

STRUCTURE

Real People Have Cancer Options.

1) Resting Zone
2) Proliferative Zone
3) Hyperplastic Zone
4) Zone of calcification
5) Zone of ossification

Perichondral Ring of Lacroix

METAPHYSIS

Loose / Spongy / Cancellous

Highly Vascular

Metaphysical # → Highest union potential common
1. Malunion common
2. Non-union rare

Hairpin Loop of Vessels

Blood vessel → Dilated Tortuous

Stagnation of Blood

Ischaemia ← Stasis

Infection → Osteomyelitis
DIAPHYSIS/SHAFT

Sharpey's

ENDOSTEUM
Most metabolically
Active layer of Bone

MEDULLA

PERIOSTEUM

absent in
neck of femur

LIST 10
BASICS (ONE LINER)

Most abundant cell of Bone = Osteocyte
Most long lived in Bone

Clavicle (long Bone) has no marrow cavity

PHYSIS - Temporary 1st cartilaginous joint

HUETER VOLKMANN'S LAW:-

Compressive force across physi ⇒ INHIBIT GROWTH
Shearing/Tensile force ⇒ PROMOTE GROWTH

Ossification centres present at Birth

Diatal Femur
Calcarneum
Talus
Cuboid

Fe
Cal
Tal
Um
Capitate: 1st Carpai Bone to愈ify [2 months] - AIIMS Nov 2017

LAW OF OSSIFICATION
2nd ossification centre that appears 1st prior last [Fibula doesn’t follow this rule]

METABOLIC BONE DISORDERS

1. OSTEONEogenesis IMPERFECTA/Brittle Bone Disease/Fragilitas Ossium/Vrolik Lobstein Disease
   COLIA1 gene mutation
   ↓
   Glycine substitution
   ↓
   No cross linkage in Type I collagen
   ↓
   No tensile strength in bone
   Type I collagen synthesis defect

Clinical Spectrum:
Pre school child → Multiple Long Bone # (PATH#)
   No H/o Trauma
   ↓
   Blue Sclera
   poor & delayed dentition

X-Ray - 3D
   Diaphyseal
   Different stages of Healing
   Deformities
Mx - 1) Braces to prevent further deformity
    2) Bisphosphonates
    3) Corrective osteotomy
       (Realignment osteotomy)
    4) Saphenectomy Surgery
4) Internal fixation + Telescopy nac
   Bailey + Dubow Rods

D/D :- BATTERED BABY SYNDROME / Caffey's Syn.

Preschool child
Multiple long bone #s
Signs of violence +

X-Ray = METAPHYSICAL #s
   (Deltal Radii/ulna)

CORONER / BUCKET HANDLE #.

II) OSTEOPTROSIS / Marble Bone Disease/
    Albersschongberg Disease

Defect in Carbonic Anhydrase II proton Pump

Defective Osteoclast bone Resorp

Excessive deposition of Osteoblastic Bone

THICK / DENSE / SCALCRRITICAL BONE
C/F: Infants - Bone Marrow Failure
  Pancytopenia
  Recurrent Infections
  Osteomyelitis of mandible
  Hepatosplenomegaly
  Recurrent haemorrhage

X-Ray of long bone - 2E = Endobony sign
  Eaten meyer flake
  Deformity.

X-Ray spine - Rugger jersey (Renal Osteodystrophy)
  Spine osteopetrosis

III. Paget's Disease / Osteitis Deformans
  High turnover bone disease
  excess osteoblastic bone formation &
  excess osteoclastic bone resorption
  H/C bone = pelvis
  Age 45p - 4th/5th decade
  Asymptomatic in most cases
  Western > Asians.
  1st H/C symptom - back pain
  Δ: Biochemical → ALP ↑ ↑ ↑
X-RAY

OSTEOPOROSIS CIRCUMSCRIPTA
COTTON WOOL SKULL
TANDO SCHANTER SIGN
FLAME SIGN / BLADE OF GRASS SIGN / ADVANCING WEDGE SIGN

PICTURE FRAME SPINE
BRIM SIGN (think a sclerotic bisphosphonate line)

M/C premalignant lesion for 2nd osteosarcoma

Doc - Bisphosphonates.

osteomalacia / malacosteon / Hungerwars
Osteopathy

Qualitative bone defect
O' Blunt → osteoid → osteon

Cause:
- Dietary intake of Ca²⁺
- Poor diet absorption
- Poor renal tubular reabsorption
- Deficient Ca²⁺
- Lack of properly formed osteon
- Compensatory ↑ in osteoblastic activity
- ↑ osteoid ↑↑
Osteoid >1.

Osteon

♂️ (15-40y)

Bone pain
Polyarthralgia
Proximal myopathy

X-Ray

Spine → Fuhmuth spine

Pelvis → Looser's zones (PA)

Smaller Looser

A Ribbon shaped translucence

cortical infarct/pseudo #

Milkman's #.

No displacements

No Callus

SITES
a) pubic ramus
b) NOF
c) ribs
d) clavicle

e) outer border of scapula
f) subtrochanteric fem
Also seen in: - Renal osteodystrophy
                Fibrous dysplasia
                Hypophosphatasia
                Osteogenesis Imperfecta

Mx - 1) Diet rich in Calcium - Milk, Green Leafy Vegetables
        - VITD - Cod/Fish Oil, Sunlight

2) Supplements

Ⅴ) OSTEOPOROSIS

1) Porous Bone Disease

2) Quantitative Bone Defect
   - H/c R/F → Post Menopause
   - H/cCause → Senile/Ageing

Drugs → Corticosteroids → Thyroxine
         → Anticonvulsants → GnRH Analogue

2° Osteoporosis

Loss osteoblastic bone resumption > ① Osteoblastic
Bone formation.
4F
Perimenopausal ♀
Mostly asymptomatic
Earliest symptom → BACK PAIN
H/c complication → Pathological #.
(U. Body of T12)

Biochemical Analysis
S. Ca²⁺ ○
S. PO₄²⁻ ○
S. Alp □

Bone Markers for Resorption
Serum & urine levels of
Type I Collagen degradation products
Proline
Hydroxyproline
Deoxypyridinoline
N-Telopeptide
c-Telopeptide

X-Ray - SPINE
→ Full mouth spine

DEXA SCAN - Gold Std
(Dual energy X-ray Absorptiometry)
WHO defines osteoporosis → T-score ≤ -2.5
Mx

DRUGS

① Anti-resorptives
  → Bisphosphonates
    (DOC)
  → Denosumab
    MOA = Δ RANK-L

② OSTEOKINETOPE
  Teriparatide
  Recombinant PTH in low intermittent dose
  DOC for Bisphosphonate resistant osteoporosis

③ ANTIRESORPTIVE + OSTEOKINETOPE
  Strontium Ranelate

Fish Mouth Spine ⇒ Osteomalacia ⇒ Osteoporosis

Roger Jersey Spine ⇒ Osteopetrosis < Renal Osteodystrophy

Lessen Consumption of Bisphosphonates

Dose
Duration

ADynamic Bone Syndrome

Clinical
  Nague Hip Pain
  Atypical Subtrochanteric Femur #1

X-Ray

Vertebroplasty
Kyphoplasty (better)
Percutaneous Skiff of Bone cement in n Body
Transverse
Lateral cortical thickening
Medial spike
No comminution

Risedronate = 35 mg tab weekly
Ibandronate = 150 mg tab monthly
Zoledronate = 5 mg I.V. yearly

**GENU VARUM**
Bow legs
H/I cause
- Children: Rickets
- Adults: O.A.

**GENU VALGUM**
Knock knee
H/I cause
- Children: Idiopathic
- Adults: Jolicoeur
- R.A.: Rickets
Father 2yr child  Genu Varum

Rickets  Idiopathic

Ca^{2+}  P0_{4}^{2-}  Vit D↓  ALP↑↑↑

vit D subcutaneous mg of
oral Vit D $\times$ 6 weeks

↓
6 weeks later

Genu varum corrected  Genu varum persists  Repeat ALP

↓
ALP↑↑↑  ALP↑

Vit D Resistant
Renal Rickets

↓
ped. nephrologist
Rickets $<$ Best Astic $\rightarrow$ $x$ - Ray

Best Prognosticator $\rightarrow$ ALP
ANATOMY

LONG BONE → Horizontal
   → Subcutaneous
   → Intramembranous ossification (IMO)
   → Two 1°, one 2° ossification centres

1st Bone to start ossifying (5th week IU) 
Last " " get ossified 

Medial 2/3 → Cylindrical 
Lateral 1/3 → Flat 

Junc of medial 2/3, lateral 1/3 = Weakest point of clavicle 

FRACTURE CLAVICLE

H/C # overall/delivery/newborn 
H/C Site - Junc of Medial 2/3, Lateral 1/3 
H/C Complication - Malunion.
   Most serious complication - N.V. Injury
   ↓
   Brachial plexus (lower Trunk) 

Mx - CONSERVATIVE :
   Figure of 8 bandage
   Clavicular Brace
SURGERY - Indications of Sx

17 N. v. Injury

27 # @ Lateral end of clavicle & A. c. Joint disruption

37 cosmetic defect

47 Floating shoulder

(I/l scapulae/glenoid neck #
& m.d. shaft clavicle #)

SHOULDER JOINT

ANATOMY

M/c Joint to undergo dislocation shoulder

WHY?

1) Synovial Joint

(Ball & socket type)

Glenoid

Head of humerus

\[ \frac{1}{3} \]

\[ e \]

\[ d \]

\[ B \]

\[ D \]

ROTATOR CUFF

Capsule +

A Subscapularis \& Lower Tubercle

L. Mined/ forgotten m.b.

I.R. 2) Shoulder

B Supraspinatus \& 0-15 Abduction

C Infraspinatus \& Greater Tubercle

D Teres Minor \& E.R. @ Shoulder
SHOULDER STABILISER

STATIC

1) Capsule
2) Glenoid Labrum (50%)
3) Negative intra-articular pressure
4) Glenohumeral ligament
   - S.GHL → 0° Abduction
   - M.AHL → 45°
   - I.GHL → 90°

DYNAMIC

1) Rotator cuff
2) Deltoid
3) Biceps

TRAUMA AROUND SHOULDER

SHOULDER DISLOCATION

CLASSIFICATION

H/ic subtype
↓
subtype
loid
(95-98%)
Mech. of Injury
Abb’d
ER
Examples
Vigorous throwing of Ball
PAINFUL
Minimally painful/painless

A.S.D. >> P.S.D. > I.S.D

Epilepsy
Electric shock
P.T. locks arm by side of head (Salvars posture)

Maximal
Minimally
X-Ray of PSD

Electric Bulb Sign

Empty Glenoid Sign

**CLINICAL TESTS for A.S.D.**

**DUGAS TEST** -
Inability to touch opposite shoulder

**CALLAWAY'S TEST** -
Periaxillary palpation of Head of humerus

**HAMILTON RULER TEST** -
Ruler touches both acromian & Lateral condyle simultaneously

**COMPLICATIONS**

M/C (Overall) - Recurrent

M/C (Immediate) - Injury to circumflex Br. of Axillary Ar

M/C (Delayed) - Recurrence

Mx - Closed Reduction.

* Method of CR -
  1) Hippocrates method
  2) Stimson's Gravity Technique
  3) Modified Kocher Technique (TEA - I)

[Thorax - ER - Adduction - IR]
RECURRENT SHOULDER DISLOCATION

MATSEN'S CLASSIFICATION

TUBS

Torn Loose

① Traumatic
② Unidirectional
  H/L → Ant.

③ Bankart's Lesion
  * Avulsion of Ant. Inf. glenoid Labrum
  * H/L cause of Recurrent ASD.

HILLSACH'S LESION

* Bony defect @ posterolateral aspect of Head of Humerus due to Repeated Impaction against Glenoid

④ 2nd H/L cause of Recurrent ASD

⑤ Surgery
  L. Arthroscopic Bankart/Hillsach's

AMBRI

Born Loose

① Traumatic
② Multidirectional

FULCRUM Test - Ant. Instability
JERK test - Post. Instability
Sulcus Test - Inf. ""

③ Bilateral
MRI - capsule laxity
Connective tissue disorder
Marfan/Ehler's Danlos variant

④ Rehabilitation
  Isometric Rotator Cuff strengthening

⑤ Internal Capsular Closure
CAUSES OF RECURRENT PSD

* REVERSE BANKART LESION

Detachment /avulsion of Post. Inf. glenoid Labrum
(BAI → PI)

* REVERSE HILLSACH'S LESION

Bony defect in Antero-medial aspect of Head of Humerus.
(TROUGH SIGN)
(opposite to Hillsach literally)

ROTATOR CUFF TEAR

young o° (20s/30s)

Pain
swelling?

\$\text{B}$ shoulder

O/E - Limitation of initiation of Abds

1st Inv = USG

TOC = MRI

Acute Atraumatic R.C. Tear

TOC: Arthroscopic Re Repair

10yr Later

young o° (30s/40s)
1. Chronic
   HRT. Irreparable Rotator Cuff Tear

   ▼

   Rx: Arthroscopic Rotator Cuff Tendon Transfer Using
   Deltoid/Supraspinatus

   ▼

   10 yrs Later

   ▼

   Elderly: O° (50s/60s)

   ▼

   Irreparable Rotator Cuff Tear +
   2° Glenohumeral Arthritis

   ▼

   Rx: Reserve Shoulder Arthroplasty

LIST 11

M/C #

Overall - Clavicle

Newborn - Clavicle

Delivery - Clavicle

Difficult Delivery - Humerus

Children - Greenstick # (Radium > Ulna)

Children around Elbow - Supracondylar # Humerus

M/C CARPAL BONES - # → Scaphoid

   Dislocation → Lunate
M/C - TARSAL BONES

# - Calcaneum

Dislocation - Talus.

M/C Bone

open # - Tibia

Pathological # - U body (T12)

stress # - Tibia > shaft of 2nd metatarsal (MARCH #)

M/C Joint to undergo Strabismus dislocation = Shoulder

LC = "  " = Knee

M/C Joint to undergo Recurrent " = Shoulder

L/C = "  " = Ankle

M/C - Tendinous Injury supraspinatus > Tendoschisis

M/C Ligament to undergo sprain A-T-F-L (ant. Talo-fibular lig)

Strongest Ligament = BiGelow’s Lig

Achilferoral Lig (IFL)

M/C Peripheral N/V Injury. Radial n/v

Best Prog (PNF) = Radial n/v

Worst Prog (PNF) = Ulnar n/v

Worst Prog despite SX = SCARPE n/v

Repair
M/c # due to Fall on Outstretched HAND

  Children = S.C. # Humerus

  Adult = # Scaphoid

  Elderly = Colle's #

M/c Articular Injury = Popliteal

LARGEST CARPAL BONE = Capitate

  1st Carpal Bone to ossify = Capitate

M/c Joint to undergo Dislocation in children = Elbow

  1st Carpal Bone # = Trapezoid

  Most centrally located Carpal Bone = Capitate

M/c Tarsal Bone to develop Stress # = Navicular

  Last Carpal Bone to ossify = Pisiform
ELBOW JOINT

- Synovial Joint (Hinge Joint)

  Radiocapitellar  <  Ulnotrochlear Jt

  Lateral condyle
  Capitulum  →  Lc  Mc
  Trochlea

  Head
  Radius

  Annular orbitolateral ligament

  Olecranon process

  Lateral view

3 Bony Pt. Relationship

Olecranon  Lc  Mc

Elbow @ flexion  →  Δ
Elbow @ extension  →  —

ALTED — # LCH / # MC / # Olecranon
NORMAL — SC # H.
SALTER HARRIS CLASSIFICATION (I-IV)

I. No obvious line
   Minor - major physeal slip
   e.g. slipped capital femoral epiphysis

II. Extra-articular injury
    Triangular metaphyseal bone fragment
    (Thurston Holland Sign)
    e.g. SC # Humerus

III. Intra-articular injury
     Physeal # line extending into epiphysis
     e.g. lower end of Tibia #

IV. 2nd HC type
     Intra-articular injury
     Rotation of distal fragment
     articular surface becomes non articular
     and vice versa
     e.g. # LCH # of necerity & ORIF is compulsory

V. Worst prognosis
   Least common type
   due to fall from height
   Initial x-ray
   partial / complete physeal crush injury
   IOC = MRI
Complications: Growth disappear
Limb length deformities

RANGE - Injuries to Perichondral Ring of La'croix.

FRACTURES OF DISTAL HUMERUS

[A] SUPRACONDYLAR # HUMERUS

M/C # due to F.O.O.S.H. in children
He # in children around elbow
Salter Harris type II
Extra-articular #
Three Bony # Relationship ⊗

M/C → Mode of Injury → F.O.O.S.H.
Mech. of Injury → HYPEREXTENSION
TYPES

EXTENSION (96%)  FLEXION (4%)
Displacement of dorsal fragment  Volar/Anterior

Dorsal/ posterior

Posteromedial > Posterdateral
Humeral Displacement Overall

GARTLAND 8  CLASSIFICATION

I
Minimally displaced
Undisplaced
Impacted #
X-ray 

M x Above Elbow
Pop slab/cart
x 3 week

II
Unicondylar
Angulation
No displacement
CR + Above Elbow
Pop slab/cart

III
Complete #
Bicondylar #
Completely displaced #
CR + K-wire
Fusion

COMPLICATIONS OF SC. H
1) Malunion → Cubitus Varus (Gunstock Deformity)
2) Neurological injuries
3) Vascular injury (MC- Brachial artery)
4) Compartment
5) Volkmann's Ischaemic contracture
6) Myositis ossificans
CUВITOS VARUS

- Gun stock deformity
- Malunited SC #H most commonly complicate this way
- Occurs due to uncorrected medial tilt
- Static deformity
- Cosmetic

FRENCH OSTEOTOMY

- Midline incision
- Posterolateral
- Whole triceps
- Triceps detachment
- Exploded, kept safe
- Ulnar N/V not explored
- Broken, medial cortex intact

NEUROLOGICAL INJURIES IN SC #H

- Usually neuropraxia
- Recover transiently
- N/C nerve injured in SC #H

\[ L \text{ overall} = \text{AIN br.} \text{ of median N/V} \]
\[ \text{Posterolateral displacement} \]
\[ \text{Posteromedial displacement} = \text{Radial N/V} \]
COMPARTMENT SYNDROME

**ETIOLOGY**

- Excessive contents
  - 1) Bone ↔ #
  - 2) Muscle ↔ #
    - children = SC ↔ H
    - adults ↔ # prox. T-bone
  - 3) Vessel ↔ vascular injury

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<th>1/F</th>
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<td>F</td>
<td>T</td>
<td>&quot;7P&quot;</td>
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1st symptom: Pain.
1st sign: Pain on passive stretching [most acute/ sensitive]

- PALLOR
- Paraesthesia
- Paralysis

Pressure ↑↑ ① 6 - 12 mmHg
② Astie ≥ 30 mmHg

# x - fasciotomy
V.I.C.

Compartment → Ischaemia → Neurosis of M/s

\[ \text{contracture} \leftarrow \text{fibrosis} \]

**Volkman's Deformity**

- Forearm → Thinned / atrophied
- Wrist → Flexed
- Palm → Hollow
- MCPJ → Hyperextended
- PIPJ → Flexed

Mix of V.I.C. → Grade Wise

- Mild
  - Passive stretching / correction
  - Turn Buckle splint
- Moderate
  - Manual therapy
  - Distal sliding of common flexor origin
- Severe
  - Proximal row carpectomy

**Myositis Ossificans**

- Mononuclear (no m/s inflammation)
- Heterotopic ossification
- Ectopic, benign, pathological bone formation in soft tissue

Website: http://mbbshelp.com
WhatsApp: http://mbbshelp.com/whatsapp
⇒ **Myositis Ossificans Traumatica**

child = SC # H

Passive manipulation/massage
Mechanical stimulus to periosteum
Ectopic bone formation.

Acute MOT ⇒ Pain Relief/Ice packs/Elevation
Chronic MOT ⇒ Sx excision of bone block in Toto

⇒ **Myositis Ossificans Progressiva**

Rare,
AD Inheritance
Fetal “condensation”
Children < 6 yrs
Microdactyly
Bone formation in cardiac H/L
Diaphragm, Tongue, EOM H/L spared
Death due to HLP fracture

H/L Joint involved in Myositis Ossificans = Elbow > Hip.

(B) ≠ LATERAL CONDYLE HUMERUS

Intra-articular
Salter Harris type II
3. Bony Paint Relationship ALTERED

Less common in infancy than SC # H
MILCH CLASSIFICATION

I

LATERAL

II

# Line w.r.t. epiphitum

MEDIAL

M/C Comp. - Lateral spur formation. due to ossification under periosteum.

M/C complication requiring Rx = NONUNION
  ↓
  Cubitus Valgus
  
  Dynamic
  Functional

Hx = Milch Osteotomy.

M/C N/V Injury = Tardy ulnar N/V Palsy
  (due to progressive increase in Cubitus Valgus)

Hx = # Lateral condyle humerus is # of necesity
  OR IF is the only Rx possible.
# SHAFT OF HUMERUS

HOLSTEIN LEWIS #

Oblique, displaced # of shaft of humerus at June of upper 2/3rd, lower 1/3rd of shaft.

Radial N/V 

Palsy

LIST - 12 CLASSIFICATION IN ORTHOPAEDICS

Graff's - DDH

(King)

Kashi wagi (MRI) = DDH

Stulberg's

Catterall

Pertshe Disease

Salters Thompson

Herring

Aitken's - Proximal femoral focal deficiency

Boyd's - Tibia pseudoarthrosis (C.P.T.)

Congenital pseudoarthrosis

Tibia

Steinberg's - A.V.N.

Bados - Monteggia's #

Mason - # Head Radius

Matsens - Recurrent shoulder dislocation

NEER's - # Proximal humerus

Bayne - Klug - Radial club hand

Arnold - Hilgartner - Hemophilia or amyopathy
Outerbridge's - Articular cartilage arthritis
Ahlback's - OA knee
Rockwood - Acromioclavicular Joint
Judet & Letournel - # Acetabulum
Winquist & Homsen - # sO F
Schatzker's - # prox. Tibia
Hawkins - # Neck Talus
Sanders (CT) - # Calcaneum
Essex Lopresti - (X-Ray) # Calcaneum
Allman's
Frykmann's ] # distal end of radius
Femoral
Melone

Teles
Young & Burgess ] # Pelvis
Pepkens — # head femur
Salter & Thompson - Perthes disease
Salter & Harris - Physial Trauma
Thompson & Epstein - Post Hip Dislocation
List 13

1) Pulled Elbow / Nursemaid’s Elbow
   Distal subluxation of Head of Radius ➔ widening of Radio Capitellar Groove
   Annular / periclecal ligament gets stuck in widened Radio capitellar groove
   ➔ child locks elbow in extension ➔ doesn’t allow anyone to touch ➔ Apprehension test +ve
   Hx = Closed Reduction

2) HOTC KISS & Terrible Triad
   Post. Elbow subluxation / dislocation
   # Head Radius
   # Coronoid process of ulna

3) Essex Lopresti # Dislocation
   Distal Radio Ulnar Jt. Disruption
   Intercosseal membrane disruption
   # Head Radius

4) MonteGiga's #
   # of proximal one third of Ulnar shaft ➔ Radial Head dislocation
   Bado's classification (I-IV) ➔ I - H/C overall
   H/C H/V Injured ➔ P.I.N.
# of necessity (ORIF is compulsory)

5) GALEZZI's # / REVERSE MONTEGGIA's # /
   PIEDMONT #
   # shaft of Radius \& Fibula at middle, distal 1/3 of shaft \& DRUJ disruption.
# of necessity (ORIF is compulsory)
   Sterno-mastoid more common than Monteggia's #

6) REVERSE GALEZZI'
   # of shaft of Ulna (\& Junc. of middle, Distal 1/3) \& DRUJ Disruption

7) LAUGIER's #
   # of Trochlea

8) HUME's #
   \# of olecranon (prox. Ulna) \& ant. elbow dislocation of radial head
   - monteggia's variant

9) NIGHTSTICK #
   Isolated \# of shaft of Ulna
   [H01] direct trauma to forearm while in a defensive stance

10) GREENSTICK #:
    "unioctothal \# of forearm bones (Radius \& Ulna) \& concave-convex deformity"
11) BARTON's #
  Intra-articular # of distal end of radius (DER) 
  Radio-carpal joint subluxation.
  * Barton's Dureae \( \Leftrightarrow \) vit C & D peny \( \Leftrightarrow \) Rickets.

12) CHAUFFEER's # / HUTCHINSON # / BACKFIRE #
  Intra-articular # of distal end of radius \( \Rightarrow \)
  Radial styloid process.
  Radio carpal Jt. \( \bigodot \)

13) SMITH's # / REVERSE COLLE's
  Extra-articular # of distal end of radius \( \Rightarrow \)
  volar/anterior displacement of distal fragment
  **H/L comp. - Malunion** (garden spade deformity)

14) COLLE's #
  Extra-articular # of distal end of radius \( \Rightarrow \)
  dorsal/posterior displacement of distal fragment
  * ABRAHAM COLLE'S
  Displacement \( \Rightarrow \)
  \( \text{D} \) \( \text{I} \) \( \text{L} \) \( \text{E} \)
  Dorsal characterise \( \Leftrightarrow \) impact \( \Leftrightarrow \) lateral

  **Complications of Colle's #**
  a) H/L \( \Rightarrow \) finger stiffness
  b) 2 nd H/L \( \Rightarrow \) Malunion (Dinner fork deformity), pseudo-malunion
c) Carpal instability
a) Carpal tunnel
e) Rupture of extensor pollicis longus
f) Post-traumatic shoulder stiffness
g) Sudeck’s osteoneurodystrophy
   (reflex sympathetic dystrophy)

Hx - Colle’s CAST (Hand shake cast)
   - 15° pronation
   - 15° palmar flexion
   - 15° ulnar deviation

13) Sudeck’s OSTEONEURODYSTROPHY
   Reflex sympathetic dystrophy
   CRPS I (complex regional pain syndrome)
      l. Bony / soft tissue injury
      2. N/V injury

Rare/delayed complication of Colle’s #
Pain (severe/intermittent out of proportion)
Swelling (stiffness, thin, shiny, stretched skin)
Hyperaesthesia
   Uninhibited v/s sympathetic stimulation.
   [over]
X-Ray = Osteopenia (↑ blood flow in sympathetic stimulation)

Hx = 1) Sympathetics
    2) NSAIDS/ M's Relaxant (amitryptiline)
    3) Sympathetic Ganglion Blockade
    4) Surgical Sympathectomy
    5) Vit C = prophylactic role

16) # SCAPHOID
H/c carpal bone #
H/c # due to foresh in adults
Retrograde blood flow
(digital → proximal)

H/c mode of injury → foresh
H/c site → waist
Scaphoid = floor/ Base of anatomical snuff box
C/F: Tenderness swelling in anatomical snuff box

X-Ray - Oblique
    PA view in 15° ulnar deviation.

H/c complication - NON UNION.
2nd H/c - AVN of prox pole
Hx → undisplaced → SCAPHOID/GULAT holding cast
     displaced → O.R.I.F. & Herbert screw
A) BENNETT'S  
I/A # of 1st MC 
OBlique 
mORE displaced

B) ROLANDO'S #  
I/A # of 1st MC 
fY shaped comminuted 
# less displaced

19) BOXERS  
# Neck of 5th Metacarpal 
(1/C Metacarpal #)

20) MALLET FINGER  
Avulsion of extensor tendon from dorsal aspect of 
Base of distal phalanx → flexion deformity 
@ D.I.P. joint

21) JERSEY FINGER  
Avulsion of F.D.P (flexor Digitorum Profundus) 
from volar aspect of base of distal phalanx

22) GAMEKEEPER'S / SKIER'S THUMB  
Avulsion of ulnar collateral ligament (UCL)  
from 1st metacarpophalangeal Jt.
23) **MADELUNG DEFORMITY**

Bl / pediatric congenital deformity

Growth retardation of ulnar aspect of distal end of radial phys.

**DISTAL ULNA:** Thick prominent

➔ Ulnar variance

Dinner Fork Deformity

**Mx = osteotomy**

(DARRACH'S PROCEDURE)

➔ ULNAR VARIANCE

➔ ULNAR VARIANCE

24) **RADIAL CLUB HAND**

Longitudinal deficiency disorder

Complete absence of ➔ Partial absence of radius

Thumb / Scaphoid / Trapezium = Absent

BAYNE + KLUG CLASSIFICATION

Bl / Pediatric congenital deformity

➔ Syndromic Associations 

TAR Syndrome = Thrombocytopenia

Absent Radix

HALT ORAM Syndrome = ASD

Fanconi's Anemia

Radial club hand
VACTER Syndrome =
- Vertebral Anomalies
- Anal Atresia
- Tracheo-esophageal Fistula
- Renal
- Radial Dysplasia

25) Polydactyly

M/c Congenital/Hand malformations

Pre-axial > Central

Post-axial

Thumb

26) Syndactyly

Fused/Conjoined/ Webbed finger

Complete < Incomplete

(Syndactylyism)

M/c Sites: Middle & Ring finger

Apert's Syndrome - Cranio Synostosis

Poland's Syndrome - I/L absence of Pect. Major

27) Preiser's Disease

Non-traumatic AVN of Scaphoid
28) Kienböck's Disease
  Premature osteochondritis non-traumatic avn of lunate

29) Kaplan Injury
  Irreducible dislocation of mcp joint
  @ mcp jb-

List - 14 Tests in Orthopaedics

Pen Test - Abductor pollicis brevis (MN)
Card Test - Palmar interosseus (UN)
Ehlers's Test - Dorsal interosseus (UN) → hold the fingers back and about
Book Test/ Fyroment's sign - Adductor pollicis (UN)

Phalen's Test - Carpal tunnel syndrome
Duklan's Test

Cozen's Test - Tennis Elbow (Lateral Epicondyle)
Yergeson's Test - Bicipital Tendinitis
Lift Off Test - Subscapularis

Dubmass Test
Callaway's T
Hamilton Ruler T

Finkelstein's T - De Quervain Tendinitis
Allen's T - Patency of sup. palmar arch
Adson's T - Thoracic outlet syndrome
Thomas T - Flexion deformity @ hip
OBER'S T - Iliotibial band contracture

SIMMOND THOMPSON T - Yen dorsalis tear
Tendinitis / tear

HIP JOINT
ANATOMY

BLOOD SUPPLY

Retrograde (distal – proximal)

Foveal artery < Br of Obturator Artery

Ant
→ Medial
→ Post

Epiphyseal Artery

Lateral

Asc. Cervical / pretendinous artery

Medial circumflex femoral artery
(MCF)

LCFA (Lateral circumflex femoral artery)

Profunda Femoris A.

Femoral artery
Lurch:

- Painless
- Diseased side ← Trunk deviates toward → N side
- Developmental Dysplasia of Hip
- Polymyelitis
- Sup. Gluteal Nv. Palsy
- U/L Thedherberg's
- Abductor
- Lurching gait

Limp:

- Painful
- Septic arthritis
- Transient synovitis Hip.
- U/L Antalgic
- Limping gait

LIST 15 RADIOLOGICAL ANATOMY OF HIP

1) SHENTON'S ARC
   - Connects Inf. margin of sup. pubic Ramus to medial aspect of head + neck of femur
   - Arc is interrupted/broken in supraacetabular pathologies.
   - Eg. DDH

2) HILGENREINER'S LINE
   - Horizontal line connecting the centres of two acetabula

3) PERKIN'S LINE
   - Vertical line from superior acetabular margin 1st to Hilgenreiner's line
4) **PERKIN'S QUADRANTS**
   Intersecting above two lines.
   - Location of Head of Femur
   - Inner Lower
   - DDH Upper Outer

5) **KLEIN’S LINE**
   Line along superior surface of Neck of Femur
   - Only intersects Head of Femur but
   - SCFE (Slipped Capital Femoral Epiphysis), it doesn’t intersect head of Femur

   ↓

   **POSITIVE TRETHOWAN’S SIGN**
   (frog leg lateral view)

---

**PAEDIATRIC HIP DISORDER**

(A) **DEVELOPMENTAL DYSPLASIA OF HIP**

Def: - Idiopathic spontaneous subluxation/dischlocation of Head of Femur from Acetabulum.
Before Birth
- Oligohydramnios
- Packaging Disorder
- IUFD
  - Congenital Muscular Tortuosity
  - Metatarsus Adductus
  - Congenital Knee Dislocation

At Birth
- M/C association
  - Breach delivery
    - Extended Knee
      - Leg
      - (10 times)
- Post Natal Theory
  - If a baby’s body
    - Extended
    - Hip/Knee
      - D.D.H

High Risk

STATISTICS:
- Incidence = 1/1000 live births
  - Western > Asians
  - 0°: 0 < 1:7 (p > 0.05)
  - Br = 20%

Amogest U/L case = Left > Right
- Overall sequence = Left > Br > Rt

Five Ts
- Female child
  - 1st born of family
    - Fair complexion (White/White)
    - Family History
    - Faulty Intrauterine Position

M/C cause - Idiopathic
- M/C association - Breach delivery & extended knee + leg
Pathogenesis:

- Dyplastic Acetabulum
  - Shallow
  - Sloping
  - Convex

upward lateral subluxation or dislocation of Head of femur

\[ \text{Shortening} \]

* Hypertrophied, Inverted, Infolded Acetabular Lesion Labrum (fibrocartilage) (Inverted Limbus Sign)

* Hypertrophied fatty tissue (Pulvinar) fill up empty acetabulum

* Hypertrophied ligamentum teres + Transverse Acetabular Ligament

* Hourglass Constriction of capsule
Clinical Presentation:

Risk factors identified:

- Asymmetrical skin crease < Gluteal fold
- Wide pelvis
- ORTOLANI's Test: Dislocated Hip [Age < 3 months]
- BARLOW's Test: Dislocatable Hip
- ALLIS SIGN / GALEAZZI's Test: Shortening

Walking age group:
- u/L - Trendelenberg/ Abductor/ Lurching gait
- B/L - Buck waddling gait

Δ:

- X Ray
- Broken Shenton Line
- Upper outer Peren's Quadrant
- USG:
  - IOE for screening of DDH
  - American Academy of Pediatrics
    - Routine USG screening for DDH at 4-6wks in females
    - Family history
    - Breech delivery
- MRI:
  - IOE for Δ of DDH
  - Overall age:
    - < 6 months
    - Kashimaage clarification
Age wise Mx 8-

< 6 months

Closed Reduction

→ Immobilization

Pavlik Harness

Von Rosen Splint

6-18 months

Open Reduction

(Using Smith Peterson's Ant. Ilio Femoral Approach - Bikini Incision)

→ Immobilization

→ Batchelor's Cast

> 18 months

Acetabular Reconstruction

M/c Sx performed = Salter's Osteotomy

Best Result = Pemberton's Osteotomy

Salvage Sx = Shelf Procedure

(B) Slipped Capital Femoral Epiphysis

→ Minor

→ Capital femoral epiphysis is well seated inside acetabulum. It is the anterolateral disruption of neck & gives apparent posteromedial epiphyseal slip.
**STATISTICS**

- **Incidence**: 1/2000
  - Male = Idiopathic
  - Male R/1F = Obesity (↑ W/A)
  - Male Association = Hypothyroidism
  - Other Association = Hypogonadism
  - 97.1% excess
  - Craniofacial syndrome

- **Age Group**:
  - Male = 12-13 yrs
  - Female = 11-14 yrs
  - M/F = 2:1
  - Boys/L = 30-35%

**PATHOGENESIS**

1. **Femoral Physis** (Head) → **Hypogonadism**
   - **Hypertrophied Immature Physi**
   - M/F factor
   - **Puberty** → **GH Surge**
     - Anterior lateral disruption of physi
     - Apparent posteromedial epiphyseal stop
**CLINICAL SPECTRUM**: SHORT, FAT, Sexually immature, 13-17yrs.

c/c - Limb\[ling\] Antalgic Gait

OUT-TOEING GAIT

- Obligatory ER @ Hip during Heel Flexion
  [DRENNAN's Sign]

- Child lies in W posture

- Restricted Abduc. x IR

**DIAGNOSIS**

- X-RAY
  TRETHOWAN's SIGN

- CT
  Acute/chronic slip

- MRI
  IOC for \( \Delta \)

\[ M_x \]

- Mild <33% \( \rightarrow \) CR in situ pinning

- Moderate 33-50% \( \rightarrow \) OR + in situ pinning

- Severe >50% \( \downarrow \) prevents further recurrence

Sx is always done B/I or otherwise length discrepancy occurs.
(c) **PERTHE'S DISEASE/ LEG A CALVE**

Germany - USA - France

**COXA PLANA / OSTEochondritis OF FEMORAL HEAD**

**Defn:** Idiopathic spontaneous osteonecrosis of head of femur mainly due to blockade of venous outflow

- Thick and distended veins
- Arterial compression
- Ischaemia

OSTEONECROSIS

**STATISTICS:**

- Incidence = 1/10,000
- **Gender:** M : F = 5:1 6 > 7 F
- Age Group = 4-9 yrs
- **B/L** = 10 - 12%

**H/Pr association:** Protein C & S Deficiency

(hereditary factor V Leiden mutation)

Other associations: Sickle cell anaemia
Passive smoking
Trauma
Mutation in Type II collagen
**Pathology**  
**Waldenstrom Classification & Staging**

- IV) Ischaemia
- III) Revascularisation + Repave ⇒ Fragmentation of Head
- II) Reossification → flat head (Coxa Plana)
  - Mushroom head (Coxa Magna)
  - Small head (Coxa Breva)
- IV) Healed & Residual deficit

**Clinical Spectrum**
- 4-9 yr old child
- 1st clinical symptom: Limping/Andalgic gait
- Pain in Hip (groin) ⇒ Knee (Referred Pain) ⇒ Thigh
- Limitation of Abduct ⇒ IR @ Hip
- Obligatory ER while hip is flensed (Catterall Sign)

**Diagnosis**

- X-ray:
  1) Gaze sign: 1/2 shaped transluency in lateral portion of head
  2) Sucking Rope Sign: Horizontal radio-opaque line in upper femoral metaphysis
Mri > Bone Scan

D/D

TB of Hip
- early acetabular involvement → TB
- Late → Perthe’s DS

Mx of Perthe’s Disease
Self Limiting Condition.

Avascular Phase - Non-weight Bearing
- Bed Rest (offload Hip)
- Abduction Brace for containment of hip.
- Skin traction to maintain joint space to relieve pain/spasm.

Repair/Healed Phase: Sx
Catterall at Risk Signs (X-Ray)
(Head at Huk)
Craze Sign
Metaphyseal Cyst
Lateral calcification
- Subluxation of Head
Horizontal Lying Physio
CAFFEY's SIGN: - Loss of Sphericity of femoral Head & subchondral # line mainly in weight bearing antero-lateral part of femoral head.

**LIST - 15 NAMED SURGERIES**

1) French Osteotomy (modified): Cubitus Varus deformity  
   (malunited supra condylar humerus)

2) Milch Osteotomy - Cubitus Valgus deformity  
   (non union Lateral condyle Humerus)

3) Marjage Operation - Volkmann's Ischaemic Contracture  
   (moderate)

4) Bankart's operation - Anterior shoulder instability  
   due to Bankart Lesion

5) Putti-Plat operation - Ant. shoulder instability due to  
   Hill Satch's lesion

6) Britton - Latarjet operation -

7) Steindler's Release - Plantar Fascia Release for  
   Pes Cavus (High Arched foot)

8) Fernandez osteotomy - Malunited Colles #.
a) Varus Deviation Osteotomy = Perthe's Disease
10) Girdle Stone Arthroplasty = T.B. Hip
11) Core Decompression = Non Traumatic AVN Femoral Head
12) McMurray's Osteotomy = Non union # neck femur
13) Pauwel's Osteotomy = Non-union # neck femur
14) Lambrecht's Arthrodesis = Fixed equinus deformity at foot
15) Grieve Green Procedure (Subtalar Arthrodesis) (PUT)
   Congenital Vertical Talus.
   L. Rocker-bottom foot
16) Keller's Operation (Excision Arthroplasty) = Hallux Valgus
17) Mitchell's - Chevrons Osteotomy = Hallux Valgus **
18) Anterolateral Decompression = TB Spine
   (MYE Surgery)
19) Hong Kong Procedure (Radical Anterior Decompression & Bone Grafting)
   TB Cervical Spine
20) Smith Peterson Osteotomy = Ankylosing Spondylitis
INFECTION

(A) OSTEOMYELITIS

Term om was coined by NELATON.

ETIOLOGY

List - 16

M/c cause of OM

Overall = S. Aureus

Acute OM, Chronic OM, Developing nabo

devolved nation/

HIV/AIDS, Diabetic (open #)

post-sx / Immuno compromised disease

Sickle cell Disease - Salmonella (Diaphysis)

I.v. Drug Abuser = Pseudomonas

Animal Bite = Pasteurella

Human Bite = E. Coli

Diabetic foot ulcer = Staph aureus

PATHOGENESIS:

M/c route = Haematogenous (blood stream)

↓

Skeleton

Axial > Appendicular

Femur > Tibia

Prox < Distal (metaphysis)
MC Bone Involved in OM
overall - Metaphysis of distal femur
Infants/children - 
Adults - Vertebral Body

Waldvoel Classification
Based on duration of symptoms
Acute OM Subacute OM Chronic OM
< 2 wk 2-4 wk > 4 wk

Immunity < Virulence

\[ \text{Acute OM} \overset{H/c \text{ complication of}}{\longrightarrow} \text{Chronic OM} \]

Path. Hallmark
ABCES
Staph aureus pus Neutrotic bone debris
SEQUESTRUM
* dead, Radiodense, Ischaemic, Neutrotic, non-viable piece of bone
* separate bone from underlying viable healthy parent bone
* surrounded by reactive, immature, subperiosteal, new bone INVOLUCRUM
* Two surface - Rough Smooth
* Never Bleed
* I Microscope = No Haversian canal
* Floats in pus, sinks in H2O
LIST - 17  TYPES OF SEQUESTRUM

Tubular = Pyogenic OM
Ring = Amputation stump, around ischemia site of Steinmann's pin
Conical/Annular = Amputation stump
Ivory = Syphilis
Feathery = TBC (intra cavitory) > Syphilis
Sand = Finesand vital OM
Coarse sand TB (extra cavitory)

* Rice Grain = TB
Black/ Coke = Actinomyces/ fungal OM
Coraliform = Perthes Disease
Kissing = Paradiscal TB. Spine
Bombay = H2S inhalation.

Mx of Acute OM

young child
Rural background
   RUBOR
   DOLOR
   CALOR
   TUMOR
   Functo Leica

   \( x 48-92 \text{ hrs} \) Knee

II Blood Counts
   CBC/ ESR/ CRP
   TLC↑ N↑ ESR↑ CRP↑
Blood culture

+ in 50% of pts

Gram staining Antibio gram

y 48-72 hr

S. pyocalcinin Level > 70 to 1000 ng/mL

Sensitive/ Specific marker for OM

Pain Relief (NSAID)
Rest
Immobilization (sling)
Cold pack
Elevation

Broad Spectrum I.V. Antibiotics (Empirical therapy)

X-RAYS

1st/Earliest x-ray sign = soft tissue shadow/ Lucency 8 in 48 hours

2nd x-Ray sign = Perosteal Rea®
(Clinal) (new born prematuee 7-10 days)

MRI

Joc for Ac® of Acute OM

≤24 hr = marrow edema

Indium 111 labelled Leucocyte scan/ Gallium-67 scan/
Technetium qam MDP scan
Chronic OM

Pt → Clinical Hallmark = Sinus
     Pathological " = Sequestrum

Rx =
1) Sinogram
2) Sinus Tract Exploration
3) Sequestrectomy
4) Scurrification
5) Curettage
6) Bone Grafting
   Antibiotic laden Bone intra-operatively
   Cement Beads
   Paprika Sign
   (PNB June, 2012)
   Good outcome

7) Debridement
8) Sinus Tract Excision
   To Prevent Recurrence
   To Prevent Sq-re Cell Carcinoma of Tract
   (delayed/ More complication)

→ Pre-op / intra-op / post-op Antibiotics (i/v or oral)

Post-op
→ Drain
  Skin Traction
  I.V. Antibiotics x 6 weeks
  Oral Antibiotics x 6 weeks
**VARIANTS OF OM**

**BRODIE’S ABCESS**
- Subacute OM
- Tibia
- M/c Bone
- Microbe get entrapped in fibrous tissue proliferation
- Immunity > Virulence

**CARRE'S SCLEROSING OM**
- Long standing chronic OM
- Mandible > Tibia
- Excess periosteal seen by an extremely dense periosteum in response to low grade anaerobe

→ **PUS** → ↔ **Swelling**

- Pain deep dull aching
- **Sinus**
- **Sequestrum**

→ **Mx**

- Curettage + Bone Grafting + Antibiotic cover
- Antibiotics + NSAIDs

**ADULTS**

- **CHILDREN**
SEPTIC ARTHRITIS

Surgical Emergency

ETIOLOGY:- H/c cause of Septic Arthritis

overall → Staphylococcal Aureus

Sexually Active Age Group → Gonococcus

PATHOGENESIS:-

*S. Aureus*

H/c Route - Hematogeneous

↓

H/c Joint → Knee > Hip

*S. Aureus*

↓

Proteolytic Enzymes

(degradative)

Collagenase

Elastase

Aggreconase

Hyelatinase

Matrix Metalloproteinase (MMP)

↓

Destroy Articular Cartilage

in 2-8hrs

Avascular

↓

Once Degenerated never

Regeneration

Devoid of peri-

chondrium

pathological fusion of joint

Type II collagen

End result - Bony Ankylosis
Clinical Spectrum:
Child Rural background
Rubor Dolor Calor Tumor Funiculo Lassio
Acute onset Severity II Critically ill Septicaemia Check! Regor

Earliest 1st symptom = PAIN
Analgesic / Limping Pain
ROM, can’t / shouldn’t be checked

Attitude of deformity
Flexion/Abduction/ER
FABER
(most comfortable position of hip
tibial, volume & maximum)

Mx:
1. Blood Counts
   (BC/ ESR/ ERP
   TLC ↑↑ N↑↑ ESR ↑↑ CRP ↑)
2. Ultrasound Guided Aspiration (Next step)
   for therapeutic purpose
   (not for acute purpose)
3. Arthroscopy (best step)
   Surgical excision & debridement of joint
Via wide incision, exposure
- through lavage
- post-op I/V Antibiotics + dress + skin Traction

Gonococcal Septic Arthritis

H/e - Knee

Not surgical emergency

Respond to Penicillin/Clindamycin.

TOM SMITH ARTHRITIS

Septic arthritis of infancy
H/e - Hip

Spread mainly due to umbilical sepsis
Since head is entirely cartilaginous, it gets completely absorbed ⇒ poor outcome

TB - Y/e cause of monoarthritis in children

LIST-18 BASIC TERMINOLOGY

1) Arthroplasty - Surgical Joint Replacement
2) Arthrodesis - " " Fusion.
3) Arthroscopy - Minimally Invasive Surgery
   (Diagnostic & therapeutic)
4) Arthroscopy - Surgical J. D. of Joint via wide excision

5) Arthrocentesis - Surgical aspiration of Joint

**SACH FOOT**
- Solid Ankle Cushioned Heel
- Base of LL Prosthesis
- 40,000 - 50,000 INR
- Expensive raw material
- Not cosmetic
- No barefoot walking
- Compulsory shoe wear
- Squatting not possible
- Solid Keel (Metal/Wood)
- Plantar/dorsiflexion not possible
- Inversion/eversion not possible
- Irregular surface walking not possible

**JAIPUR FOOT**
- Base of LL Prosthesis
- 40,000 - 50,000 INR
- Cheap material (Haw)
- Cosmetic
- Barefoot walking possible
- Shoe wear optional
- Squatting possible
- Flexible Keel (Rubber)
- Plantar/dorsiflexion possible
- Inversion/eversion possible
- Irregular surface walking possible

**SAFE FOOT** - Solid Ankle Flexible Endoskeletal Foot
AMPUTATION PROTOCOLS

1) Longer post flap
   Smaller Ant. flap.
   So that suture line lies anterior to midline
   in coronal plane

2) **MYODESIS**
   Should be done in children
   → Trauma
   → Tumour

3) **NERVES**
   → Double ligated
   → Gentle traction is applied. Cut in single
   shot to allow prox cut end to retract a max.
   as possible to avoid Post Amputation NEUROMA

4) **A1K Amputation**: Musculotendinous junct of
   Quad. Femorii.

5) **B1K Amputation**: Musculotendinous Juni of
   gastrocnemius
**KNEE JOINT**

**LIGAMENTS OF KNEE**

* MENISCI
  CUSHIONS/SHOCK ABSORBER

**MEDIAL MENISCUS**
- **C-shaped**
- more elliptical
- Wider than LM
- peripherally attached to MCL
- Less mobile
- Can’t escape twisting injury
- More injured

**LATERAL MENISCUS**
- Semicircular shape
- Free from LCL
- (LM)(Popliteus)(LCL)
- Intra-articular tendon
- More mobile
- Can escape twisting injury
- Less injured

**VALGUS INJURY** (more common)

**VARUS INJURY** (less common)

**Clinical Tests**

Apley's Grinding Test
MC Murray's Test

**CLINICAL TESTS**

Ioc
MRI

Cold Std IX

Most Reliable IX

ARTHROSCOPY

Prone - Apley's
Supine - Thompson's
ER + flex
IR + flex

Supine

Glad - medial jt.

@ Grab dutch end of leg

Med collateral lig damage

Excessive valgus
can be done

Undue opening of medial Jt. space

VALGUS STRESS TEST

Ant Drawer Test

Supine - knee flexed 90°

Hold tibia

Finger on post part

Extend (ant draw)

Pain excessive

Lachman - 30 flexion

* ant drawer test

Pivot shift test

Valgus + IR + flex

Tibia pops out
Rx = Arthroscopic Partial Meniscectomy

* Menisci more to knee movement. They move forward - Knee extension. They "backward" - flexion.

* MCL ligament to degenerate = Medial Menisci

* Post Partial Meniscectomy
  LM degenerate 7 MM remnants

* M/c Meniscal Tear:
  Overall = M&M
  - Acute ACL tear = L.M.
  - Chronic ACL = M.M.

Collaterals
Coronal plane stability

M.C.L.
attached to M.M
More fixed
Less mobile
Can't escape [swelling, Injury]
More injured

L.C.L.
free from L.M.
less fixed
more mobile
escapes
Less injured
VAŁGUS Injury  VARUS Injury

VAŁGUS STRESS test  CLINICAL TESTS  VARUS STRESS Test

Mx

If CLINICAL TEST A

IoC

MRI

Isolated collateral ligaments are best managed conservatively
(Rest/cold pack/relaxation)
(Knee brace)

MCL ligament to injured = M.C.L.

CRUCIATES
Sagittal plane stability

A.C.L.

Intraepiicular

Intraarticular

Intrasynovial

P.C.L.

Intracapsular

Intraarticular

Intrasynovial

ACL prevents knee anti-translation of tibia over femur

PCL prevents external post-sagging of tibia over femur
Downhill / Downstairs
Mid substance MCL site of tear
Hyperextension injury > M01 > Hyperflexion injury

Clinical Tests

ANT. DRAWER's Test (knee 90° flexion)
LACHMANN's Test
Best for ACL acute (knee 30° flexion)

Pivot Shift Test
Most specific test / Gold std.
Test for ACL

If clinical Test +
IOC
MRI

Gold Std. Tx
Most Reliable Tx
Arthroscopy

Rx = Arthroscopic ACL / PCL Reconstruction
(M/C donor tendon = Semitendinosus + Gracilis Graft)
ACL = middle geniculate artery (Br. of popliteal A)
PCL = post. articular artery (Br. of Tibial A).

H/c common surgically operated leg = ACL (knee)

H/c cause of Haemarthrosis = ACL

\[ \text{ACL} \]

\[ \text{ANTEROMEDIAL} \]

- taut in knee 90° flexion

\[ \text{knee 90° flexion} \]

\[ \text{Knee complete extension} \]

\[ \text{AM} \]

\[ \text{PL} \]

Most pain sensitive structure in joint = capsule
Least " " " " = Articular cartilage

Meniscal cyst -

- appear as swelling along post. joint line
- disappear in joint on knee flexion

(PISANI SIGN)
Meniscal Tear: MM > LM
Meniscal cyst: LM > MM

* Locking of knee
  - Medial rotation of femur over tibia
  - Knee extension
  - Standing posture

Unlocking of knee
  - Lateral rotation of femur over tibia
  - Knee flexion
  - Setting posture: popliteus

* Portal in arthroscopy:
  - Supero-lateral: patellofemoral joint visualization
  - Antero-lateral: vision
  - Antero-medial: instrumentation

ACL/PCL tear: 9 athletes > 5 athletes

↓

Narrow intercondylar notch

Hormonal influence
  - Leg laxity

Gold standard:

Asopy

MRI

Knee cartilage: arthroscopy

IOC
Multiligament Knee Injury
Injury to at least 2 out of 4 (except meniscal)

PLICA SYNDROME
Embryonal remnants of synovium

4 types:
- Medial
- Lateral
- Suprapatellar
- Infra patellar

C/F:
- Anterior knee pain
  - Exaggerate on prolonged sitting
  - Locking/catching symptoms

Association:
- Chondromalacia patella
- Comp.
- Meniscal tear

Investigation:
- MRI

Gold Standard:
- Arthroscopy

Rx:
- Arthroscopic plica excision
ONCOLOGY

LIST - 19 MOST COMMON

H/c Bone Tumour = Metastasis/2º

H/c Malignant B.T. = Metastasis/2º

H/c 1º Malignant B.T. = Multiple Myeloma > osteosarcoma

H/c Benign B.T. = osteochondroma/exostosis

H/c True Benign B.T. = osteoid osteoma

H/c 1º Malignant B.T. =

\[ \text{Leiomyosarcoma of 1st decade of life} \]
\[ \text{Chondrosarcoma of chest wall} \]

H/c Radiation induced BT = Osteosarcoma

Most Radioresponsive BT = "Bone"

H/c Benign Tumour of Hand Bone = enchondroma

H/c Benign B.T. of Hand bones = ""

H/c 1º Malignant B.T. of Hand Bone = chondrosarcoma

H/c Malignant Tumour of Hand - see
CHONDROBLASTOMA / CODMAN'S TUMOR

- Benign Tumor
- Age < 18 yr.
  - Skeletally immature pts
- Centric
  - Epiphyseal Expansion
  - Slightly Symmetrically
- Long standing Pain & Swelling.
  (Pon erection)
- Mimics Synovitis.
- X-Ray - well circumscribed
  - Regular margins
  - Epiphyseal Lesion
  - Slipped calcification

BIOPSY:
- Chicken wire calcification.

Mx:
- Extended Curettage + Bone Graft/Bone cement

GIANT CELL TUMOR / OSTEOCLASTOMA

Locally aggressive
5-15% act as malignant

H/l Bone - Distal femur epiphysis

CT - spine (vertebral body)
4E: Ecentric
   Epiphyseal
   Envelope < asymmetrical
   Eggshell crackling

Age Group: 20-40 yr (skeletally mature pt.)

X-RAY
   Geographical defect
   Soap bubble appearance

Mx
   Wide excision & customised prosthesis
   Allograft reconstruction

Microscopy: GCT \rightarrow Giant cell (40-60 nuclei)

GIANT CELL VARIANTS

A. Neurymal Bone Cyst (closed)
B. Brown's Tumour
C. Histiocytoma
D. Osteoblastic Fibroma
E. Focal Giant Cell Rich Granuloma
F. Fibroma of non-ossifying type (H
c. variant)
G. Giant cell Rich Osteosarcoma
H. Histiocytoma
ANEURYSMAL BONE CYST

Locally aggressive BT

Hist site - Metaphysis of Prox. Femur
ABC - spine (post. column)
Age Group - 10-18 yr
Expansile < Grossly (More pelvic)
Asymmetrical Bruit & on auscultation.

cutaneous

X-RAY multiple blood filled sinuous
t well defined septate in between

Closest Giant cell variant

Rx Wide excision + Allograft Reconstruction.

OSTEOSARCOMA

Highly highly malignant BT.
Hist 1° malignant BT. of non hematopoietic origin.
Hist Radiation induced BT.
Most Radioresistant Bone Tumour.

Types

1°

75%

2°nd Decade
d & novo

20°

25%

5°th/6°th decade
pre malignant lesion
Mic - Paget's De of Bone (<1%)  
Post radiation  
Chk. OIOM  
P53 mutation  
Hered. surv. of Retron oblastome

Mic Bone: Distal femur (metaphysis)  
Mic site of 2° from osteosarcoma, Lung  
(Via blood stream)

Bone to Bone metastasis

X-ray  
2 P’s  
Periosteal ren (Sunny ray / Sun built  
along Sharpey’s Appearances)

Periosteal tension (Cadman’s A)

Tx = Neoadjuvent Rx

Pre-op chemo  → Radical Excision  → MEGA prostheses (arthroplasty)

Size, vascularity  
Metastate  
Post-op chemotherapy

T10 Protocol  
(Rosenberg Protocol)

High dose Methotrexate  
(Bleomycin  
Cyclophosphamide/Ifosfamide  
Doxorubicin)
**Enchondroma**

M/c Benign Bone Tx of Hand Bone
M/c Bone Tx of Hand Bone

*Age Group* - (4th - 6th Decade)

*Sex* > F

M/c site - Hand > Foot

Phalanges > Metacarpal

**X-Ray**

Well defined lytic lesion with or without calcification (stepped calcification)

Usualy Solitary

Rarely Multiple

**Ollier**

Multiple enchondromatosis

**Maffucci**

Multiple enchondromatosis + Phlebolith + Cavernous Hemangiomas
OSTEO CHONDROMA / EXOSTOSIS

H/c Benign B.T.
Not true B.T.

\( \sigma > \varphi \)

H/c site = Metaphysical Distal Femur

Age group = 4-12 yr

Usually regresses before skeletal maturity

Types:
- Sessile
  - 2 out stalk
- Pedunculated
  - 2 stalks

Types:
- Solitary
  \( \Rightarrow \) Multiple

H/M

- MASADA SYNDROME
- Hereditary multiple osteo chondromatosis
- Hereditary multiple exostosis

Mx = Surgical excision in total or symptomatic
OSTEOID OSTEOMA

H/c True Benign BT.
2nd/3rd decade
0°>9°
Femur
O/o -> spine (post. column)

Peripheral thick. Reactive Sclerosis

Structure

Central Radial Dense Portion Rich Nidus
OSTEOID
Dia < 2cm

Night Pain
Aspirin Relief
Low Dose Aspirin
Radiofrequency Ablation
Curettage of nidus

OSTEOBLASTOMA

Rare BT. (aggressive than O.O.)
2nd/3rd decade
0°>9°
Spine (Post. column)

Radiolucent Peripheral Rim

Central Sclerotic Portion Rich Nidus
Dia > 2cm.

↑
40-50%
Marginal erosion →
Bone grafting / Bone Cement
EWING'S SARCOMA

5-15 yr ᵃ

Pain, Swelling → thigh

M/c site = Femur (die)

CBC, TLC ↑

ESR, ESR ↑

CRP, CRP ↑

Mimic = Osteomyelitis

NSAIDs, Antibiotics → Temporary Relief

X-Ray

- Laminated, Lamellated
- Periosteal Reaction
  (Orange peel appearance)

↑

TOC: MRI

Best = Biopsy

↓

Histopathological

Small round cell +

PAS +

diffuse sensitive

Immunohistochemistry

MIC-2 +

CD 99 +

CD 5 +

NSE +

S-100 +

Karyotyping

t(11;22)

Most Ast +

t(7;22) +
Bone to Bone Metastasis - Ewing’s > Osteosarcoma

Most Chemotherapy Sensitive

**Rx:** E.C.R.T. (Extra Corporeal RadioTherapy) + internal fixation

**List-20**

**One Liners (METASTASIS)**

1) Bony 2° → P → Ca Breast > Lung
   
   child → Neuroblastoma
   
   overall sequence - Breast > Prostate > Lung
   
   BPL

2) Bony 2°

   Blastic - Prostate + Seminoma

   Lytic - Ca Kidney + Ca Thyroid + Ca Lung

   Mixed - Ca Breast

Tox for Occult → Blaste 2° = Bone Scan

   Lytic 2° = PET-CT

Pulsatite Bony 2° → Follicular Ca Thyroid

   Renal Cell Ca.

M/c Site of 2° from Ca Breast = Thoracic Spine

M/c Cause of Path # = Osteoporosis > Bone 2°

M/c Site of Path # - overall - Vertebral Body, T12

L due to O.Porsis → "

L due to Bone 2° - Neck of Femur
<table>
<thead>
<tr>
<th>Parameters</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of lesion</td>
<td>&lt; ( \frac{1}{3} ) rd</td>
<td>( \frac{1}{3} ) - ( \frac{2}{3} )</td>
<td>&gt; ( \frac{2}{3} )</td>
</tr>
<tr>
<td>Site of lesion</td>
<td>UL</td>
<td>LL</td>
<td>around hip</td>
</tr>
<tr>
<td>Nature of lesion</td>
<td>Blaute</td>
<td>Med.</td>
<td>Lyte</td>
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<td>Pain due to</td>
<td>Mild</td>
<td>Mod.</td>
<td>Severe</td>
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<td></td>
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</tr>
</tbody>
</table>

\[ \text{Total} > 6 \Rightarrow \text{High Risk of Path #} \]

\[ M_x = \text{prophylactic internal fixation}. \]
TB

POTT'S SPINE

ETIOLOGY - Mycobacterium TB

- Pulmonary TB: 10^2-10^9 bacillary load
- Skeletal TB: 10^5 bacillary load (Pulmonary)

PATHOGENESIS

H/c Route: Haematogenous

Site: Lung > Lymph node > GIT > Skeleton

H/c site of TB:

M/c SITE

- Spine > Hip > Knee
- Foot > Elbow > Hand > Shoulder

L/c SITE OF SKELETAL TB

Bursal TB (Amongst Bursa)

H/c Bursitis

- Hip (against Bursa)

L/c Site of TB in Bone/Joint:

Mandible > TMJ
TYPES OF LESION:

I> PARADISCAL TB

1/ C Type
Arterial spread
1st part: V. Body Adjacent to IV. Disc
Kissing Sequestrum.
H/C Type / Lesion to complicate into POTT'S PARAPLEGIA.

II> CENTRAL

Venous spread (interosseus venous plexus)
1st part: Centre of V. Body
IV. Disc is usually preserved
Later stage: Whole Body Collapse 'CONCERTINA COLLAPSE'
↓
Flat V. Body 'Vertebra Plana'

III> ANTERIOR TB

Spread suprapetaleally beneath A.L.L
Children
Wet/exudative TB
ANEURYSMAL phenomenon (X-ray)
IV) POSTERIOR / APPENDICEAL TB.

LC type
LC site = Facet Joint
2nd LC site = Spinous Process

CLINICAL SPECTRUM & -
1st / earliest symptom = Backpain
1st / earliest sign = Paraspinal M/s Spasm
↓ R.O.M. @ Spine
Cautious Gait
Military Attitude

Constitutional Features of TB (60% of cases)

COLD ABSCESS (tumour +)
No. of Hours / Days / Later
Travel along NV Bundle + muscle sheath

Deformity: prominence spinous process due to kyphotic deformity

Knuckle ~1 v. Body
Angular Kyphus ~ 1/3 v. Bodie (ribbed)
Rounded Kyphus > 3 v. Bodie
DIAGNOSIS:

⇒ X-RAY:

1st x-ray sign → ↓ Iv-Disc Space
V. Body denitrue/erosion
Paravertebral soft tissue shadow
BONY ANKYLOSIS

⇒ TB of any bone / joint ends up in FIBROUS ANKYLOSIS except spine (Bony Ankylosis)

⇒ TB of any bone never shows periosteal reaction on x-ray except Tubercular dactyle/sphenova ventosa

⇒ MRI: T2 for pott's spine

⇒ CT guided Biopsy - Most Reliable / Most Gold Std for Δru

Mx:

* Chemotherapy (main stay) → A.T.Z
  
§x
  1) Defaulters
  2) Relapsers
  3) Resistance
  4) Complication over Vital str
  5) Late presentation (advanced paraplegia)

* Bed Rest

* TAYLOR'S SPINAL BRACE
sx

1) HONG KONG OPERATION Ant. decompression TB cervical spine

27 ANTEROLATERAL DECOMPRESSION + BONE GRAFTING
- M/C sx performed
- DOTT & ALEXANDER 1947
- Dr. S.M. Tuli ⇒ Lateral position
Semicircular incision

Str. to be Removed:
1) Transverse process
2) part of pedicle
3) v. body (divided)
4) post. part of ped
5) I.V. Disc (divided)

POTT'S PARAPLEGIA
M/C Site = U.T.S.

I
Pt. unaware of neuro deficit
O/E: Ankle clonus
Spasticity

II
Pt. aware of neuro deficit + support ambulatory
N: Sensory
Motor Loss

III
Paraplegia in extension
Sensory loss < 50%
Sensory loss > 50%

IV
Paraplegia in flexion
Sensory loss
Sphincter Loss
### Prognostic Markers / Factors

<table>
<thead>
<tr>
<th>Good</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Age</td>
</tr>
<tr>
<td>Young</td>
<td>Older</td>
</tr>
<tr>
<td>Early</td>
<td>Late</td>
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<tr>
<td>Duration</td>
<td>Duration</td>
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<tr>
<td>Shorter</td>
<td>Longer</td>
</tr>
<tr>
<td>Progression</td>
<td>Progression</td>
</tr>
<tr>
<td>Slow</td>
<td>Rapid</td>
</tr>
<tr>
<td>Lesson Type</td>
<td>Lesson Type</td>
</tr>
<tr>
<td>Wet / Exudative</td>
<td>Dry</td>
</tr>
<tr>
<td>Severity</td>
<td>Severity</td>
</tr>
<tr>
<td>Stage I / II</td>
<td>III / IV</td>
</tr>
<tr>
<td>Gen. Condition</td>
<td>Gen. Condition</td>
</tr>
<tr>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Kyphotic</td>
<td>Kyphotic</td>
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<tr>
<td>Deformity</td>
<td>Deformity</td>
</tr>
<tr>
<td>&lt; 60°</td>
<td>&gt; 60°</td>
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<tr>
<td>Cord Status</td>
<td>Cord Status</td>
</tr>
<tr>
<td>In MRI</td>
<td>In MRI</td>
</tr>
<tr>
<td>M/C cause of kyphosis in India = TB</td>
<td></td>
</tr>
</tbody>
</table>

Myelomalacia Change
TB HIP

Spine TB > Hip TB (15% Skeletal TB cases)

Form of Appearance

- Acetabular roof (H/I) (A)
- Epiphysis of Head (B)
- Metaphysis (area of watershed between (C) femoral & obturator circulation = BACCHUS: A
- Greater Trochanter (D)

STAGING OF TB HIP

I SYNOVITIS:

- Flexion + Abduction + ER (FABER)
- Joint effusion + Capsular distension
- X-RAY: Widened Joint Space

II EARLY ARTHRITIS:

- Flexion + Abduction + IR (FABER)
- Detrusion of Articular Cartilage
- True shortening <1cm
- X-RAY: Narrowing of Jt. Space
Advanced Arthritis / Late

Flexion + Adduction + IR
Further destruction of joint
True shortening \( \geq 1 \) cm

X-ray - Complete destruction of joint space / head / acetabulum

Late Arthritis & Subluxation / Dislocation

Flexion + Adduction + IR
Gross shortening
Upwards & Lateral subluxation / dislocation of head

False acetabulum higher up
(Wandering acetabulum / Travelling acetabulum)

Morter & Paste Appearance

Clinical Picture:
5 - 15 yrs

H/c Earliest symptom - Painful limp
Limping / Antalgic gait
Muscle wasting
Shortening
Deformities
Constitutional features
Cold Abscess

Late Stage - Fibrous Ankylosis

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X-RAY:

- PHEMISTER's TRIAD
  - Juxta articular osteopenia (1st X-ray sign)
  - Periarticular erosions
    - Fracture

Mx = Active Stage → AT.T.
   - Skeletal traction
   - If pt. doesn't respond to above
     - Wilkinson's Joint Clearance Sx
       (Debridement)

Healed Stage

- Subtotal chondrectomy osteotomy
- Hindlestone excisional arthroplasty
- Arthrodesis (surgical fusion of a joint) →Hip
  → Painless, fixed, stable joint
- Arthroplasty → Painless mobile, stable joint
  (THR)
OSTEOARTHRITIS

Degenerative Joint Disorder [DJD]

Non Inflammatory

Steer wear, tear joint disorder

R/F:

$q > 0$

Age $> 65$ yrs

BMI $> 30$

Sedentary Life Style

Occupational Hazard

Previous Trauma

Joints:

Knee

OA Knee

M/c Bone = Patella

M/c compartment = Medial

M/c muscle = VMO

Varus Medial

Oblique

Hip

Spine

1st CM.C.JT

2nd M.T.P.JT

PIP Jt

DIP Jt

H.C.P.JT

Rheumatoid arthritis
PATHOGENESIS

1st Layer = Articular Cartilage

OUTERBRIDGE STAGING

I. Articular cartilage water content IT
   softening of articular cartilage

II. Fissures / Cracks / Segregation

III. Partial detachment

IV. Complete detachment
   & exposed subchondral bone

CLINICAL

60 +

1st Earliest Symptom - Pain
   Tenderness
   Swelling
   Crepitation
   Deformity
   Knee = Genu Varum
   Bouchard's, PIP Joint node
   Heberden's, DIP Joint node
   Walking distance

X-RAY:

1st Earliest X-ray sign = Asymmetric Reduction in
   Joint space
   Osteophytes
   Loose Bodies
Subchondral Sclerosis

Absolute destruction of joint space

**Mx:**

**Conservative:**
1. Walking with stick or opposite hand
2. Hinged knee braces or offloading devices
3. NSAIDS
   - Ibuprofen
4. COX-2 inhibitors
   - Etoricoxib 60/90/120 mg
   - No GI side effects
5. Topical liniments
6. Isometric quadriceps strengthening exercises
7. Precautions

**Surgical:**
1. **Arthroscopy**
   - Initial phase of disease
   - Remove inflamed tissue
   - Remove loose body
   - Arthrolysis
2. **Total Knee Replacement**
   - Absolute Indication
   - Pain
**Glucosamine**
Diacerein
Chondroitin sulfate
S-adenosyl methionine
(PLACEBO A EFFECT)

ADVANCED TRAUMA LIFE SUPPORT

**Polytrauma**
Injury ≥ 2 systems

**Triage**
SEQUENCE OF 1st SURVEY (ATLS)
* Cervical Spine Control
  - Hard Cervical Collar
  - Philadelphia collar
  - Log roll position

* Airway
  - Suction
  - Endotracheal Intubation

* Breathing
  - Rule Out:
  - Tension Pneumothorax
  - Rهemothorax
  - Flail chest

* Circulation – Hemodynamic parameters
  - Pulse
  - **BP**
  - Urine output
  - Tachycardia + Hypotension + oliguria
  - Hypovolemic shock
Stop Bleeding > IV fluid / BT.

* massive catastrophic H2g
  l circulation is a priority even before

* Disability
  GCS
  Verbal
  Motor

* Exposure
to rule out occult injuries

TRAUMA AROUND HIP.

# PELVIS

TILE'S CLASSIFICATION

TYPE A
Horizontally +
Vertically Stable

① # not involving
  ring
Avulsion #
# Iliac crest

② # of ring
  (stable)
Mx, conservative

TYPE B
Horizontally unstable +
Vertically Stable

B1. = open Book #
  c1 = U/L
  pubic symphysis
  diafract/diastasis
  c2 = B/L

B2. = Lateral Compression
  c1 = U/L pubic rami
  #
  B3 = Lateral Compression
  c2 = c/L pubic #
    (Bucket Handle #)

TYPE C
Horizontally +
Vertically unstable

① # of ring
  (stable)
Mx, conservative

② # not involving
  ring
Avulsion #
# Iliac crest
M/C Presentation / complication (Type C)

↓

Hypovolemic Shock

(Avg. Blood Loss = 2 L

Pelvic venous plexus

Hypotension + Tachycardia)

Mx of Type C

Immediate pelvic external fémorae.

(To J pelvic volume create pelvic tamponade

Effect create pelvic hemostasis.

MOREL - LAVALLEY LESION

→ Post-traumatic closed degloving soft tissue injury in

skin & subcutaneous tissue

→ Vessels + lymphatics perforate fill the potential

space with blood, serosanguinous fluid, necrotic fat

→ Pt. presents as enlarging painful mass in anterolateral thigh close to greater trochanter

Rx = Aspiration & tube drainage
HIP DISLOCATION

Post. H.D.  
90%  
P.H.D

Mech. of Injury  
Flexion  
Adduc.  
JR

Ant. N.D.  
7-8%  
AHD

Flexion  
Adduc.  
ER

Central # Dislocation of Hip  
1-2%  
CHD

Flexion  
Abd.  
Adduc.  
JR

Clinical  
FAD-IR  
FAB-IR

Mc Complication  
AvN of Head of Femur

Mc N/V Injury  
Sciatic  
N/V

Femoral  
N/V

Mx  
Closed Reduction  
Gen. Anaesthesia

Method of CR  
1) Stirrups Gravity Method

2) East Baltimore Left

3) Modified Allis Method  
(Of choice)
① # of PROXIMAL FEMUR

② #ITF

ER

Gr. Force

NOF

Intracapsular
5th/6th decade

Trivial Trauma
(low energy fall)

Mod-severe

Pain in Scarpa's Δ

ITF

Intra capsular
7th/8th decade

Mod-severe Trauma

Severe pain,
Swelling, ecchymosis
around G.T.

< 1 inch

0-45°

AVN of Head
Non-union.

Shortening

ER Deformity

M/c Complication

Malunion

> 1 inch

45-90°

ANATOMICAL

PAWEL'S

GARDEN'S

Clavification

EVANS

BOYD, GRIFFITHS
Mx Internal fixation:
- DHS / DHS / PFN
- Dynamic Hip Screw
- Dynamic condylar screw
- Proximal femoral nail

AO Protocol for Mx of # NOF (Speed)

\[ \text{Age} \]

\[ \text{< 60 yrs} \]

\[ \text{< 3 weeks} \]

Int. fixation
- Cannulated screw
- Usually 3 screws
- Inserted Δ pattern

MR1 to see viability of head
- AVN
- Revascularisation
- Meyers operation
- Vascularised M's pedicle grafting (Quadratus Femoris)

\[ \text{> 60 yrs} \]

\[ \text{> 3 weeks} \]

OA +
- THR
- Hemiarthroplasty
- Bipolar

OA -
- X-Ray to look for G.T.
- Upriding G.T.
- Hume Murray's shaft medialising osteotomy
- Lateral surface closing wedge ostectomy
- Osteotomy
# Shaft of Femur

Young adults
20-30yrs
O×2
Associated with severe trauma

Classification

- Prox ⅓rd
- Middle ⅓rd (M/C)
- Distal ⅓rd (Supracondylar # Femur)

Complications:-
1) Hypovolemic shock
   Avg. Blood loss = 1-1.5L or 2-4 units.
2) Fat embolism syndrome
3) Infection
4) Knee stiffness
5) Malunion
6) Delayed/non-union

MX

- <6yrs
  - Paulik
    - Harness
  - 6-15yrs
    - Hip spica cast
    - Gallow's
    - Bryant's traction
  - 5-10yrs
    - TEN
    - Titanium
    - Clarke
    - Noeling
  - >10yrs
    - Intramedullary
    - Interlocking
    - Nailing
FAT EMBOLISM SYNDROME

Young (20s - 30s)

Bergmann's Triad

Cerebral
- Delirium
- Confusion
- Convulsion
- Decortication
- Stupor
- Coma

Cutaneous
- Petechiae
- Haemorrhage
- Chest

Cardiopulmonary
- Dyspnoea
- Tachypnoea
- Tachycardia
- Cyanosis
- Hypoxia
- Hypoxemia

Mx:
1. O2
2. I.V. fluids
3. Forced alkaline diuresis
4. I.V. steroids to counter chemical pneumonitis
5. Pulmonary embolectomy
6. Heparin (Double edged sword)
   Lipase
   Lipase used for limited pts.
**WADDELL’S TRIAD**

Femur # + Head Injury + Intrathoracic/
Intra-abdominal Injury

Sequence of Cord Presenting & Shortening 2. AIIMS Hay
P.H.D. > # Sor > Subtrochanteric # > # IT.P. > # NoF

**LIST-21 ANGLES IN ORTHO**

Cobb’s L = Scoliosis

K L = Dickson’s / Kyphosis L = Pott’s Spine

Q L = Quadriceps L = Recurrent Patellar Dislocation

Pauwel’s L — NOF #

Garden’s L —

Bauman’s L to Supracondylar # Humerus

Bohler’s L — # Calcaneum

Gissone’s L —

Meary’s L — Pes Canul

Kite’s L — CTEV / clubfoot

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LIST - 22  X-RAY VIEWS

Judet View - # Acetabulum
Zanca View - Ac Joint
Stryker Notch View - Hillsach's Lesion
West point Axillary View - Bankart's Lesion
Oblique/PA view with in Ulnar deviation - Scaphoid

Von Rosen view = DDM
Merchant's View = Patellar Subluxation
Moritise View = Ankle AP view in 15° Internal Rotation

→ Symptom Injury
   (Inf. Tibiofibular JI)

Canale View - # of Talus Neck
Harri - Braden View - # Calcaneum
Scéondipity View - Sterno Clavicular St
Ball Catcher's View - Erosions of in RA
Swimmer's View - Lower Cervical Spine
**LIST-23**  SPLINTS IN ORTHO

- Cock up Splint → Radial N/V Palsy
- Knuckle Bender Splint → Ulnar N/V Palsy
- Acroplone Splint → Brachial Plexus Palsy
- Turn Buckle Splint → VC (Mild) Volkmann's Ischaemic contracture
- Coaptation Splint → # shaft of Humerus
- Paulik Harness → DPH
- Von Rosen Splint →

**Ankle Foot Orthoses** - Foot Drop

- Taylor's Brace → Thoracic spine
  - Trauma
  - Tumour
  - TB

**LIST-24**  CASTS IN ORTHO

- Hand Shake Colle’s #
- Glass Holding # Scaphoid
- Cylinder/Tube # Patella
- PTBC (patellar Tendon Bearing) # Shaft of Tibia
- Minerva → Spine Injury
- Risser’s → Scoliosis
- U/Hanging Cast → # Shaft of Humerus
- Turn Buckle Cast → Scoliosis
LIST- 25

Traction

Dunlop - Supracondylar
Smith's
Crutch Field Force - Ax Spine Injury
Garden Well
Galway
Bryant's
Perkin's - #SOF in Adults
Buck's - Modified Skin Traction # for LBP
Agnes Hunt - Flexion deformity of hip.
**ANATOMY**

ADD° + INV° → VARUS

ADD° + EV° → VALGUS

**Abduction**

**Adduction**

TALONAVICULAR / TARSAL JT

MID

CALCANEUS

FIBULA

PLANTAR FLEXION

EQUINUS

TIBIOTALAR / ANKLE JT

TALOCALCANEAL / SUBTALAR JT

INVERSION

EVERSION

ARCHES

1° CALVUS

PLANUS
Club Foot

Definition:
Congenital malformation of Ankle, Leg, Foot complex characterized by
- CAVus (arches of foot) 
- Adduc* (talonavicular Jt)
- Varus < Inversion (talocalcaneal Jt)
- Equinu (tibiotalar Jt)

Statistics:
- Incidence 1/1000
- M:F = 2:1
- M/L cause = Idiopathic
- M/L association = Neural Tube Defect (Spina Bifida occulta SY)
  - B/L - 60%
  - Asian = Western
    - (PITX-1), (TBX-4) gene pathway

Pathogenesis

Theories
- Developmental arrest theory
- Myofibrillar theory
- 1st germplasm defect theory
Bony Pathology $\text{TALUS}$ small & hypoplastic

$\text{Talonavicular Fr. Subluxation/}
\text{dislocation}$

$\text{overconver}$

$\text{Tendo Achilles}$

$\text{Tibialis Posterior}$

$\text{P]antaree Flexion}$

$\text{EQUINUS}$

$\text{Adduc}$

$\text{Inversion}$

$\text{VARUS}$

CLINICAL SPECTRUM $\rightarrow$ Dorsiflexion Test $\oplus$

Inability to approximate the dorsum of foot to anteromedial border of leg

X-RAY $\text{KITE'S ANGLE/Talocalcaneal Angle}$

$\theta 30-55^\circ$

$\Delta < 25^\circ$
At Birth – Infancy (0-1yr)

PONSETTI TECHNIQUE

Dr. Ignacio Ponseti → Date of Birth
3rd June
Club foot day

MANIPULATION & CASTING

By Doctor
Not by mother
Reversal of deformity
Started as soon as possible after birth

FULCRUM – Head of Talus

AIM – Talonavicular Jt. Reduction

SEQUENCE:
Cavus → Varus → Equinus

Ponseti’s Technique

0

Immobilization

1

Day
CTEV Shells
Dennis Brown
No heel – equinus
Abduction Splint

Night
Straight Inner Bolster – Adduction
Outer shoe Raise – Inversion

11

Age 1-5yrs
PMSTR

Posterior medial Soft tissue
Release
Turco’s operation
McKay’s Release

0

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III. Age > 3 yrs
Bony Surgeries
Lateral Column Shortening Procedure
Dwyer's Osteotomy
Dillwyn Evans Sx
Licht-Blau's Sx

IV. Age > 10 yrs
TRIPLE ARTHRODESIS
Surgical fusion of three joints.
  - Talonavicular Jt
  - Talocalcaneal Jt
  - Calcaneocuboid Jt

H/C Comp's - Talonavicular Jt pseudoarthrosis
LIST - 26  #  INJURIES & EPONYMS

1) ODONOGHUE'S  UNHAPPY TRIAD
   Injury to ACL, MCL, MM

2) JUMPER'S #
   U shaped sacral # due to fall from height

3) JUMPER'S KNEE
   Tendinitis of patellar lig (Lig patellae)

4) SINDING LARSEN JOHANSEN SYNDROME
   Partial rupture/avulsion of patellar tendon from lower pole of patella - Tendon in lig patellae

5) BUMPER'S #
   # Lateral condyle of Tibia

6) SEGOND'S #
   # Tibial condyle extending into Tibial spine → ACL tear

7) TODDLER'S # / CAST # #
   Children fall from height spiral # Tibia
AVIATOR's 

# Neck of Talus

**TALUS**

1) Retrograde blood flow
2) Max. wt bearing bone of body (kg/cm²)
3) NO m/s attachments
4) SQUATTING FACETS

---

# Neck of Talus

AVN appears Ein 4-6 wk → disappears

Hc Comp. - Body of HAWKIN'S SIGN

Subtalar arthritis - Good X-Ray sign = Revascularisation

---

LOVER's # / DON JUAN's #

Intra-articular # of calcaneum due to fall from height

Usually Bil

Hc complication = Malunion

X-RAY → Bohler's L

- Crucial angle of Gissane

10) POT'TS #

Medial & Lateral malleolus #

11) COTTON'S #

Medial Malleolus + LM + PM
12) Pilon's
  Intrarticular # of distal tibial
  epicondyl (distal tibial articular
  surface) & metaphyseal commuication

13) Hoffa's
  Coronal plane # of
  one or B. femoral
  condyle

14) NUTCRACKER's #
  Intrarticular # of cuboid

15) LISFRANC's # DISLOCATION (T.M.T.)
  Tarsometatarsal Jt. # Dislocation

16) CHOPART's # DISLOCATION (I.T.)
  HNtratarsal Jt. # Dislocation.

17) RUNNER's #
  Spiral # of distal fibula
  (hairline)

18) JONES #
  # of 5th Metatarsae @ metaphyseodaphyseal Jn.
  JMD - Jone Met
19) PSEUDO JONES / DANCER's / TENNIS #
# of 5th Metatarsal @ tuberosity / tip of due to
violent pull of Peroneus Brevis

TENNIS ELBOW
Lateral Epicondyle
M/c => E.C.R.B.
Extensor Carpi Radialis Brevis

GOLFER's ELBOW = Medical Epicondyle.
In Golfer Tennis Elbow > Golfer's Elbow

TENNIS LEG = Rupture of medial head of Gastrocnemius

20) STRADDLE #
B/L Sup. Inf. pubic rami #

21) DUVERNEY's #
Crescent shaped iliac wing #

22) MARCH #
Injury of 2nd Metatarsal