

# 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 # SOF

Thomas collar - soft cervical collar

Thomas wrench - # medic<sup>n</sup>

Thomas Test - Flexion deformity @ Hip

5) PERRIVAL POT

Pott's # → Bimalleolar # (MM + LM)

Pott's spine → TB of spine

6) JAMES PAGET

Paget's Disease of Bone

" " " nipple

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 ~~term~~ use of Biodegradable implants

4

LORENTZ BOHLER

Father of Traumatology

Bohler's Braun splint

Bohler's Angle → # callus

Bohler's Stump → skeletal traction

GERHARDT KUNTSCHER

Kuntscher nail

MARTIN KIRSCHNER

Kirschner wire

MAURICE E. MILLER

Co-founded AO - Arbeitsgemeinschaft  
für Osteosynthesefragen

ABRAHAM COLLES

Colles #

JOSEPH LISTER

Father of Antiseptic Surgery

AMBROISE PARE

Father of amputation surgery

WTC MORTON

Father of modern anaesthesia

W.C. ROENTGEN - discovered X-Ray  
Father of Radiology on 8th Nov, 1895  
World Radiology day

ENNEKING

Father of orthopaedic oncology

5

John Charnley

Father of arthroplasty

1st Joint

↓  
HIP

INSALL

NORMAN W. SCOTT

KELLY

I.S.K.

Total Knee Replacement

IMASAKI WATANBE

Father of Modern Arthroscopy

JOHN BARTON

Barton's #

Barton's Disease → { Vit C = scurvy  
                                  { Vit D = Rickets

KENJI TAKAI

Father of arthroscopy

CAFFEY

Caffey's Syndrome - Battered ~~Bad~~ Baby Syndrome

Caffey's Disease - Infantile Cortical Hyperostosis

↳ H/L Bone - Mandible

GAVRIL ABRAMOVICH ILIZAROV

Ditmar's Heterogenesis

DR. B. B. JOSHI

JESS Joshi's Ext stabilising system

DR. S. M. TULI

Musculoskeletal TB

DR. P. K. SETHI

Jacpur Foot

## DAYS

6

- Bone & Joint Day - 9<sup>th</sup> Aug  
World Spine Day - 16<sup>th</sup> Oct  
World Arthritis Day - 12<sup>th</sup> Oct  
World Radiology Day - 8<sup>th</sup> Nov  
World Clubfoot Day - 3<sup>rd</sup> 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<sup>rd</sup> of V. Body
- 2) Post 1/3<sup>rd</sup> of I.V. Disc
- 3) Post. longitudinal ligament (PLL)

##### POST

- 1) Post Longital lig. complex
- 2) NEURAL ARCH  
Pedicle  
Transverse process  
Sup. articular process  
Inf. articular process  
Laminae  
Spinous process



# LIST- ① - TERMS IN SPINE

7

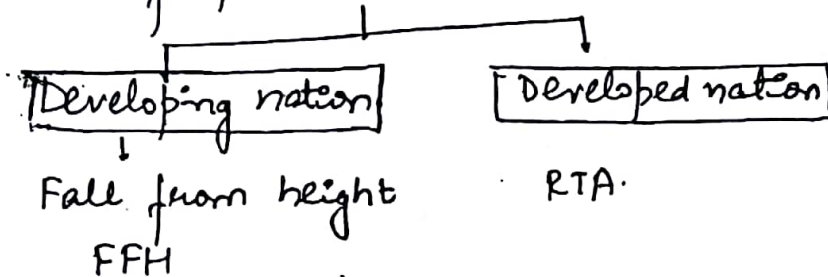
Spondylitis → Paraspinal M/c spasm

Spondylolysis → # of pedicle / Pars Interarticularis

Spondylolisthesis → ~~split~~ slippage of 1 v. Body over another v. Body.

# LIST- ② M/c In SPINE

→ M/c Mode of spinal Trauma



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

→ Worst mechanism of spinal Trauma  
Translation > Flexion rotation

→ Spinal Canal - widest at c<sub>2</sub> 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

PNI ♂ WORST " → ULNAR N/V

PNT = worst prognosis. = SEPTIC N/V  
(despite surgical repairs)

8

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 #s/ Injuries of spine = eponyms

JEFFERSON'S #

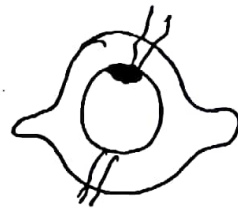
Burst # of C<sub>1</sub> ring (Atlas)

Involves @ Ant - Post Horn

85% pts - No neurological deficit

Undisplaced # → collar

displaced # → HALO VEST



HANGMAN'S #

Mech: - Hyperextension followed by distraction

Spondylolysis (# of pars interarticularis/pedicle)

of C<sub>2</sub> (axis) = spondylolisthesis of C<sub>2</sub> over C<sub>3</sub>.

C<sub>2</sub>-C<sub>3</sub> I.V. Disc disruption.

CLAY SHOVELLER'S #

avulsion # of tip of spinous process of C<sub>7</sub> > T<sub>1</sub>

seen in the labourers who do heavy wt

lifting = arms extended

CHANCE # / SEAT BELT INJURY / JACK KNIFE INJURY

Head on collision of driving seat ~~'belt~~ RTA

Mech: Flexion → Distraction → Rotation.

Horizontal # Line Travelling the vertebral Body through all three columns

Level - T<sub>12</sub> - L<sub>2</sub>

50% pts → concomitant intraabdominal injury

UNDERTAKER #.

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

# subluxation of lower cervical spine =  
C<sub>6</sub> - C<sub>7</sub> I.v. disc disruption / tear.

SCIWORA \* (PGI)

Spinal cord injury without Radiological Abn<sup>Ⓝ</sup>

children < 8 yrs

Initial X-Rays - <sup>Ⓝ</sup>N

Presentation - Neurodeficit  
No spinal reflexes

IOCs MRI

upper cervical spine

## NEUROGENIC SHOCK / SPINAL SHOCK

young ♂

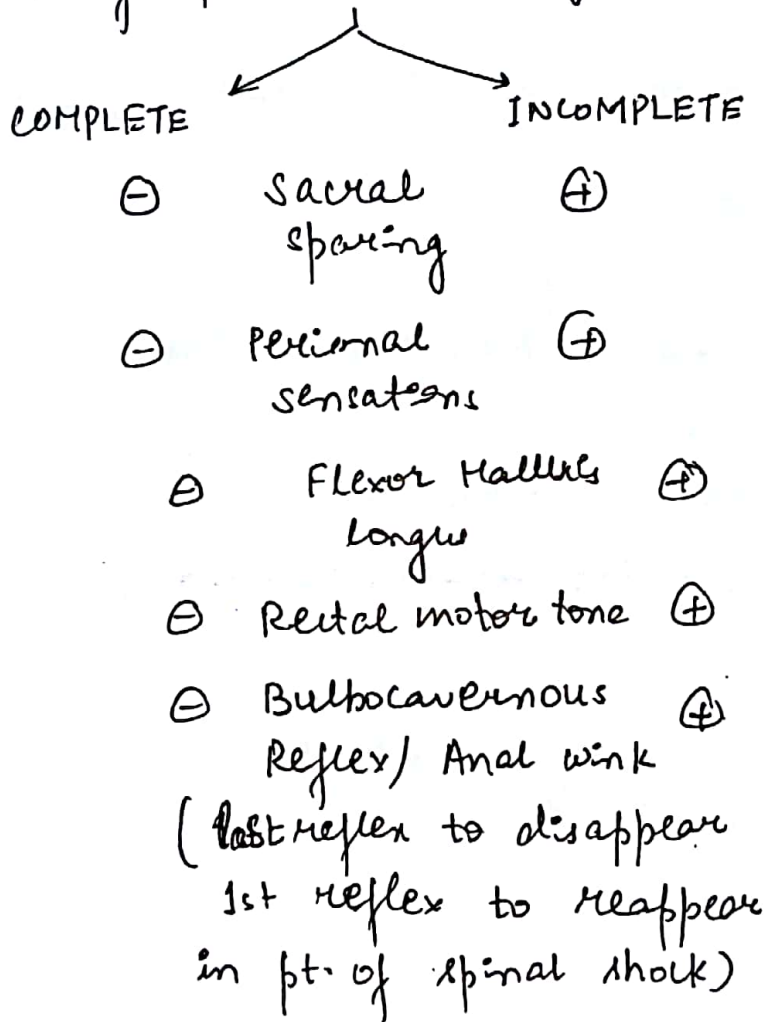
RTA.

Unconscious

Hypotension.

Bradycardia → Hallmark

M/c site of spinal cord injury → Lower C. spine



IOC - MRI.

## PAEDIATRIC SPINE

11

### ① KLIPPEL FIEL SYNDROME (AKIM)

Dystrophia Brevicollis Congenita

Bony pathology / segmentation failure

Congenital fusion of cervical vertebrae

child

TRIAD OF KFS

short webbed neck

Low post hairline

↓ ~~Reduction~~ Range of movement @ neck

Short statured child

M/C association → Sprengel's deformity

Other: other associations-

Congenital heart defects

ocular anomalies

but not

Mx - to prevent complications

Cervicothoracic scoliosis

Avoid collision sports.

### ② CONGENITAL MUSCULAR TORTICOLLIS (CMT)/WRY NECK

Muscular pathology

overcontraction of Sternocleidomastoid (SCM)

fibromatosis of SCM.

PALPABLE NECK MASS

@ birth

↔ in 4-6 wks after birth.

Associations - Developmental dysplasia of Hip.

Metatarsus Adductus



Contracted SCM @ junc<sup>n</sup> of U  $\frac{2}{3}$  - L  $\frac{1}{3}$

12

Ⓡ side > Ⓛ side.

90-95% pts → Regular stretching exercise.

5-10% pts → surgical release of muscle  
only after swelling/mass persists  
> 1 year of age

Forceps injury → Injures SCM

Complications → 1) T/L Head tilt

4/4 Chin left deformity

(Cock Robin ~~def~~ appearance)

2) PLAGIOCEPHALY

(asymmetrical development of  
skull, face).

### III IDIOPATHIC ADOLESCENT SCOLIOSIS

♀ > ♂

around puberty

Double curve

↓  
Thoracolumbar

Single curve

←  
Thoracic  
spine  
(N/C)

→  
Lumbar  
spine

R > L

Double curve progresses earlier than single  
curve

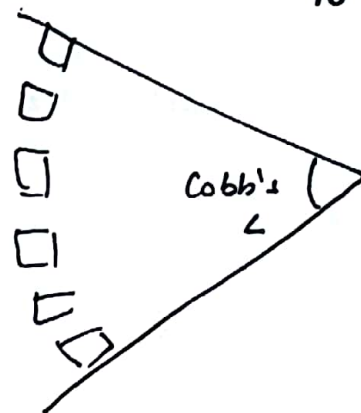
## COBB'S ANGLE

13

$< 30^\circ$  → unlikely to progress

$30^\circ - 50^\circ$  →  $10 - 15^\circ$  progression

$> 50^\circ$  → progress @  $1^\circ/\text{year}$



3% → scoliotic ~~fit~~ tilt

↳ less than 10% of population. - requires Rx.

### → SPONDYLOLISTHESIS

Slippage on 1 v. body over another v. Body

M/C Level:  $L_5 S_1 > L_4 L_5$

M/C N/v root irritated -  $L_5$

### TYPES OF SPONDYLOLISTHESIS

#### A) ISTHMIC/LYTIC

M/C type

Defect in Pars Interarticularis

Congenitally weak pars Interarticularis

↳ sports activity → FATIGUE  
# of pars

#### B) DYSPLASTIC

Rare, congenital type

No defect / No # in pars

Defect in formation of 1st sacral arch & superior facets of  $S_1$

Neurodefect is more in this type compared to isthmie type

As there is growth spurt (14 year ♀, -16 year m?)

# LISTHETIC CRISIS

14

Acute onset of sudden pain & rigidity in  
paraspinal m/s & functional / spastic scoliosis.

## C) DEGENERATIVE

2nd MC type > Isthmic

M/C Level L4-L5

♀ > 50 yrs

Senility → disc degeneration → Facet Injury  
Osteoarthritis /  
2° osteoarthritis

slippage ← Facet Joint ↓  
(usually low grade) Unstable

## D) TRAUMATIC

# in an area other than pars → slip.

## E) PATHOLOGICAL

Generalised /

Localised Bone pathology

→ # of pars interarticularis

### → Clinical Spectrum

Asymptomatic initially

Incidental Δ

1st symptom → Backache

Radiculopathy

spasm on passive stretching of legs

degenerative type  
Low back discomfort

Dysplastic type  
Acute + sudden pain.

⇒  $\Delta$  :-

X-Ray :- oblique view of L.S. 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  $\odot$  finding in oblique X-Rays of L.S. Spine)

AP view - Inverted Napoleon HAT sign  
(Least useful) (due to superimposition of sacrum + L5)

Flexion + Extension views - to see spinal stability

Mx of spondylolisthesis :-

Based on Meyerding's classification/staging  
(AP diameter of sup. surface of lower vertebra to vertebral body is divided into quarters)

I	<25%
II	25-50%

→ conservative

III	50-75%
IV	>75%

→ Surgical when there is

- progressive neurological deficit
- canal stenosis
- Refractory pain

## LIST - 5 MYOTOMES

- C<sub>5</sub> - Deltoid
- C<sub>6</sub> Wrist Extensors
- C<sub>7</sub> Wrist Flexors / elbow flexors.
- C<sub>8</sub> Finger Flexors
- T<sub>1</sub> Finger Abductors
- L<sub>1</sub>L<sub>2</sub> Hip Flexors (Iliopsoas)
- L<sub>3</sub> Knee Extensors (Quadriceps)
- L<sub>4</sub> Ankle Dorsiflexors (Tibialis ant)
- L<sub>5</sub> Extensor Hallucis longus
- S<sub>1</sub> Ankle Plantar flexors (Gastro soleus)

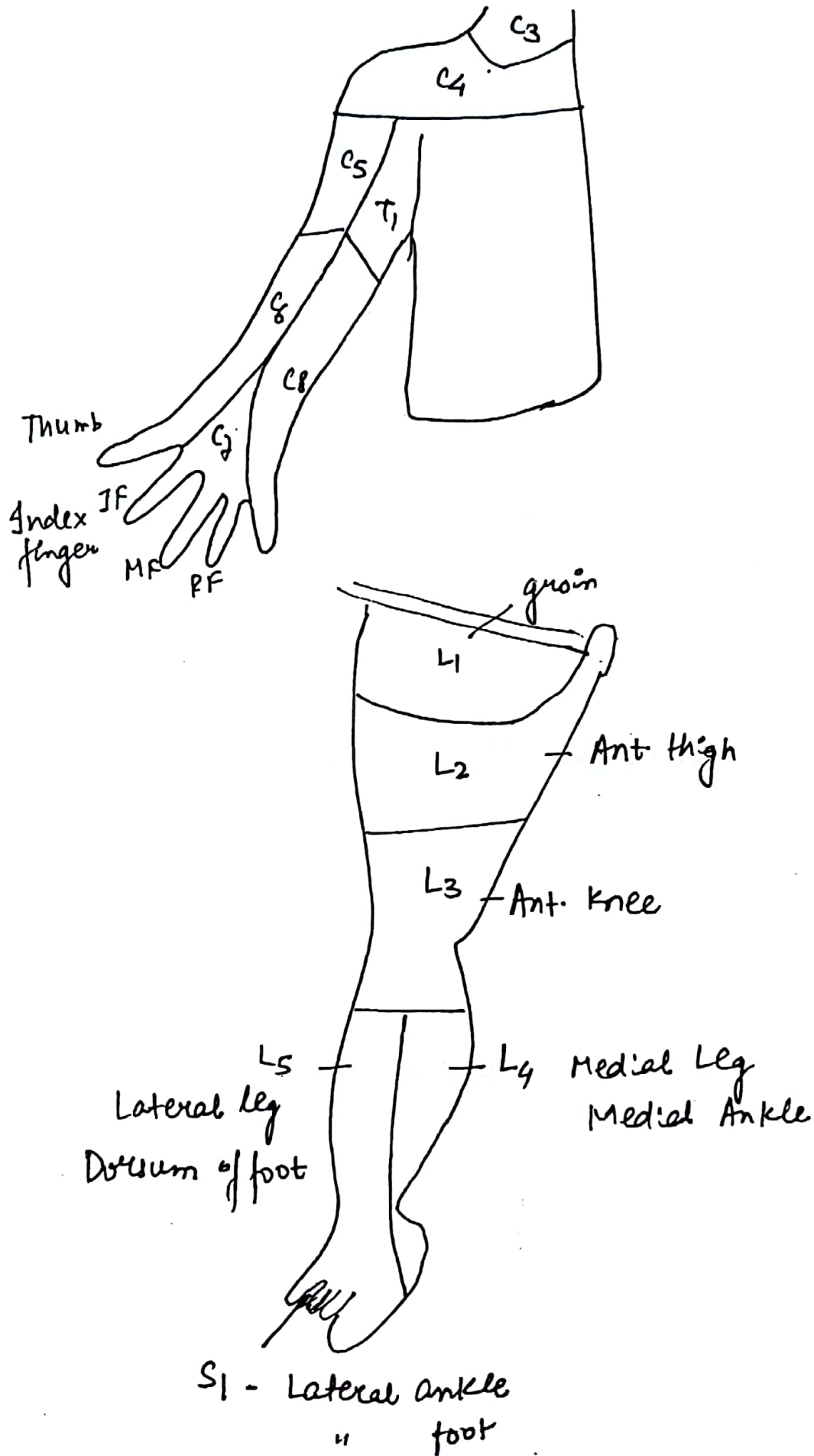
## LIST- 6 REFLEXES

- C<sub>5</sub> Biceps
- C<sub>6</sub> supinator (Brachioradialis)
- C<sub>7</sub> Triceps
- L<sub>3</sub> L<sub>4</sub> Knee Reflex (Quadriceps)
- L<sub>5</sub> S<sub>1</sub> Plantar Reflex (Femoris)
- S<sub>1</sub> S<sub>2</sub> Ankle Reflex (Gastro soleus)

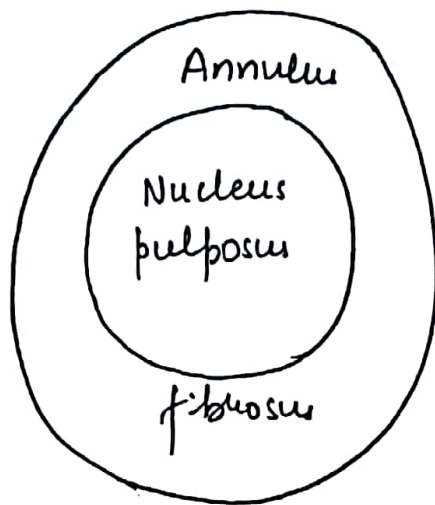


LIST 7

DERMATOMES



# PROLAPSE INTERVERTEBRAL DISC



M/c Level-  $L_4 L_5 > L_5 S_1 > C_5 C_6 > C_6 C_7$

## MRI BASED STAGING

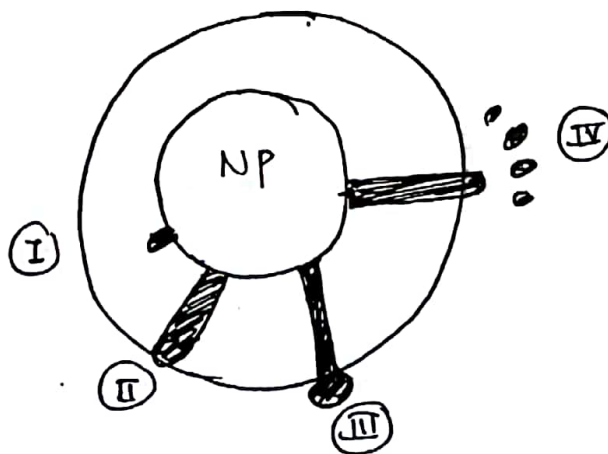
I → Disc Degeneration/Disc Bulge

II → Disc Protrusion

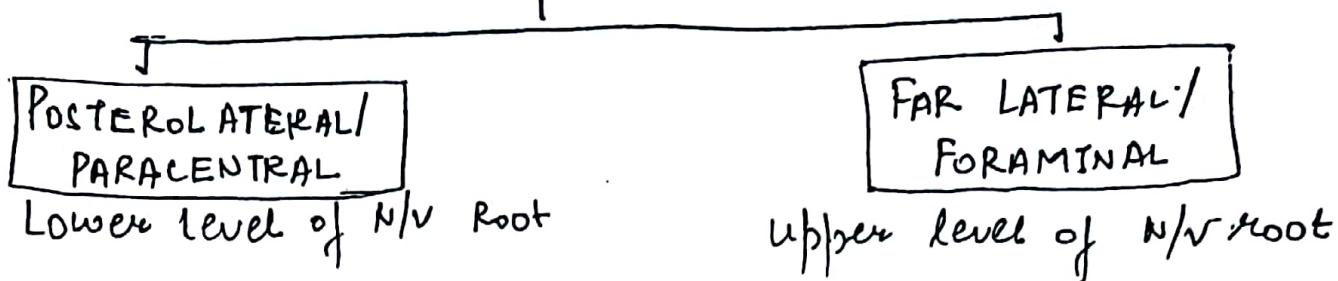
III → Disc Herniation/Extrusion

IV → Disc Sequestration.

SCHMORLE  
NODE



⇒ TYPES of PIVD - Depending upon the direction of prolapse



⇒ CLINICAL TESTS

- 1) Straight Leg Raise
- 2) Bhaggard's sign
- 3) Lasque sign
- 4) Bowstring sign of McNAB

IOC :- MRI.

Mx - Conservative Mx :-

Bed Rest  
NSAIDs  
M/s Relaxant } Acute Pain.

Intermittent Lumbar Traction

Superficial Heat  
→ Hot packs  
→ Infrared therapy

Deep Heat  
→ Short wave diathermy  
→ Ultrasonic therapy

TENS for Radicular pain.  
Transcut. electrical N/V stimulation

Lumbar Belts/ Corsets

Epidural steroids

Spine extension Exercise

Chronic  
Pain

Indications for Sx

ABSOLUTE

RELATIVE

- 1) Progressive neurological deficit
- 2) Cauda equina synd.
  - ↳ If established Sx should be done in 6 hours or irreversible damage occur
- 1) Severe sciatica pain despite 6 weeks of conservative &
- 2) Recurrent incapacitating sciatica attacks. (>3 per year)

SURGERY - Decompression = DISCECTOMY

\* SURGICAL APPROACHES ATIMS May 2015

- Laminectomy
- Hemilaminectomy
- Laminotomy (fenestration Sx)  
of choice → via microscope

LAMINOPLASTY → was done in cervical canal stenosis

# LIST - 8 Flag Signs of Backache (AIIMS 21 2015)

RED

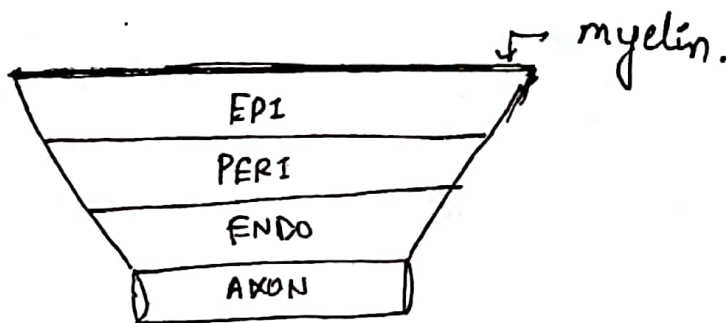
- 1) Age < 20 yrs
- 2) Age > 50 yrs
- 3) Cachexia
- 4) Constant pain
- 5) Saddle anaesthesia
- 6) H/o malignancy/steroid use/ I.V. drug abuse

YELLOW

- 1) Anhedonia
- 2) Low mood
- 3) poor job satisfaction.
- 4) High functional limitation > 1 month
- 5) psychological disturbance
- 6) social limitation isolation
- 7) Alcohol dependence

~~BRADSTROP'S~~

## PERIPHERAL NERVE INJURY



## SEDDON'S CLASSIFICATION

### NEUROPRAXIA

Physiological conduction block

Anatomy  
Axon → (N)  
N/v sheath →

Transient demyelination.

### AXONOTOMESIS

Partial anatomical conduction block.

Axonal disruption sheath (N)

Surgery (I)

### NEUROTOMESIS

Complete anatomical conduction block.

Axon + sheath disrupted

Surgery is compulsory

eg. I



Spontaneous recovery  
is a rule.  $\leq 6$  wks

eg. postural / positional

N/V palsy  
Traumatic

Saturday Night palsy. RN

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

### BAASTRUP'S DISEASE / KISSING SPINES

- Degenerative Disease
- Hypertrophy, enlargement of adjacent spinous process in lumbar spine in elderly pts
- FOCAL MIDLINE Backpain which worsens in extension
- M/c Level - L4L5
- Rx - Conservative

## LIST - 9      COMPRESSION NEUROPATHY

Carpal Tunnel sy - Median N/v @ wrist

Guyon's canal sy - ulnar N/v @ wrist  
(~~pis~~ pisohamate canal)

Cubital tunnel sy - ulnar N/v behind medial epicondyle

Radial Tunnel sy - Post. Int. N/v (motor Br).

Pronator sy - Median N/v between two head of pronator Teres

Kiloh Neven sy - Ant. Int. N/v (motor Br. of median N/v)

Piriformis sy - sciatic N/v compression

Meralgia paraesthetica - Lateral cut. N/v of thigh

Cheiralgia paraesthetica - sup. sensory br. of Radial N/v

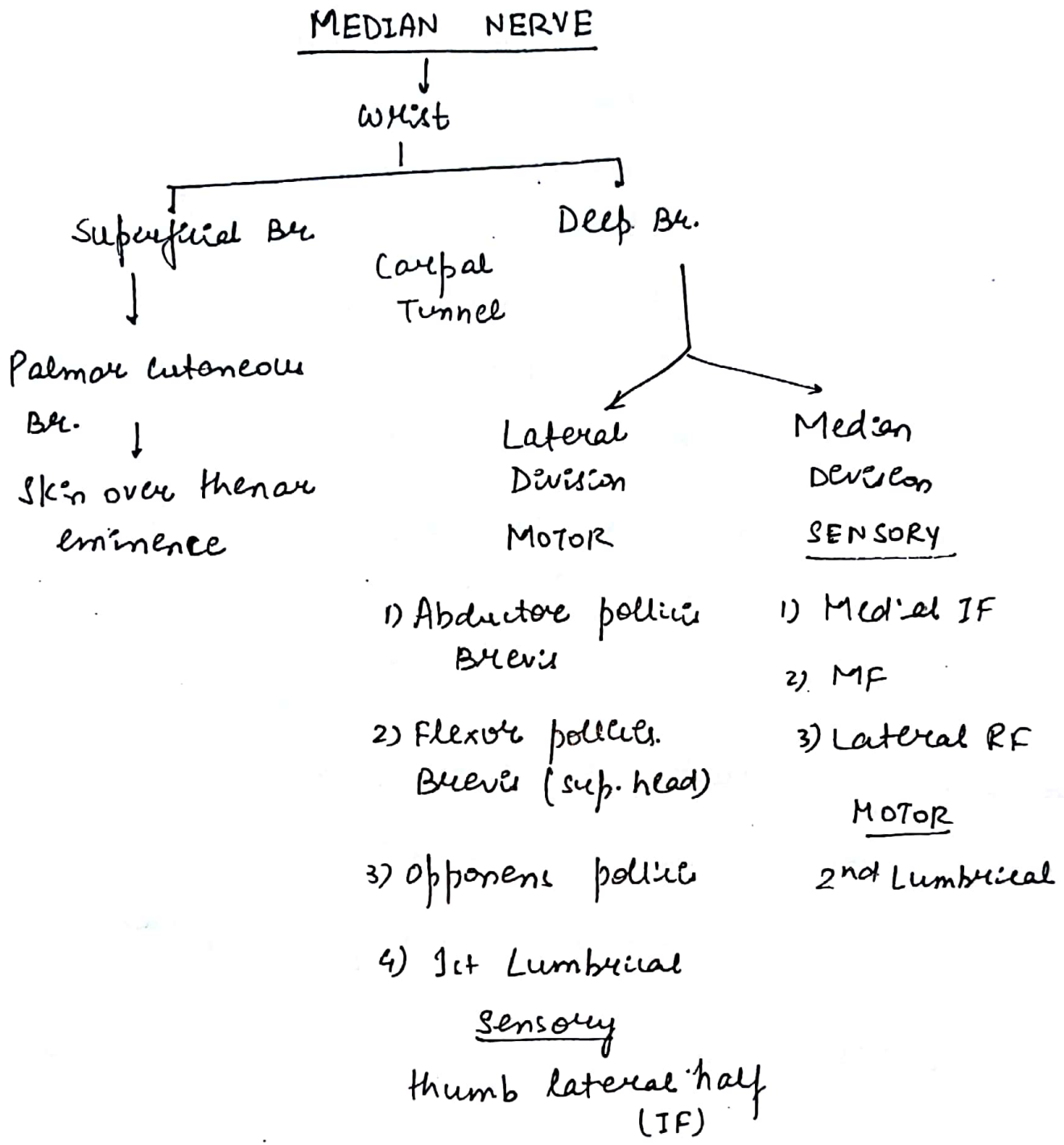
Morton's Metatarsalgia - Interdigital plantar N/v compression.

excruciating pain on squatting

NOTALGIA PARAEESTHETICA - Sup. sensory neuropathy in infraclavicular area.

Paresthesia + Dysaesthesia

Rx - Pregabalin.



# OSTEON

ORGANIC  
(30-35%)

INORGANIC  
(65-70%)

MATRIX  
(90-95%)

CELLS  
(5-10%)

MINERALS

$Ca^{2+}$

$PO_4^{2-}$

Calcium hydroxy  
apatite

PROTEINS

CP → Type I collagen

NCP → osteocalcin / Bone gla protein \*  
           → osteonectin  
           → osteopontin

Enzyme - Alkaline Phosphatase

&

## CELLS

OSTEOBLASTS

{ CP  
 { NCP  
 { ALP

OSTEOID

{  $Ca^{2+}$   
 {  $PO_4^{2-}$

OSTEON

OSTEOCYTES

Resting / spent / Mature /  
 Quiescent osteoblasts

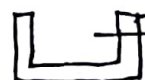
Most abundant cells  
 Most long lived cells

OSTEOCLASTS

GIANT CELL FAMILY  
 Monocyte-macrophage  
 cell lineage

2R's

ReModelling  
 Resorption of Bone

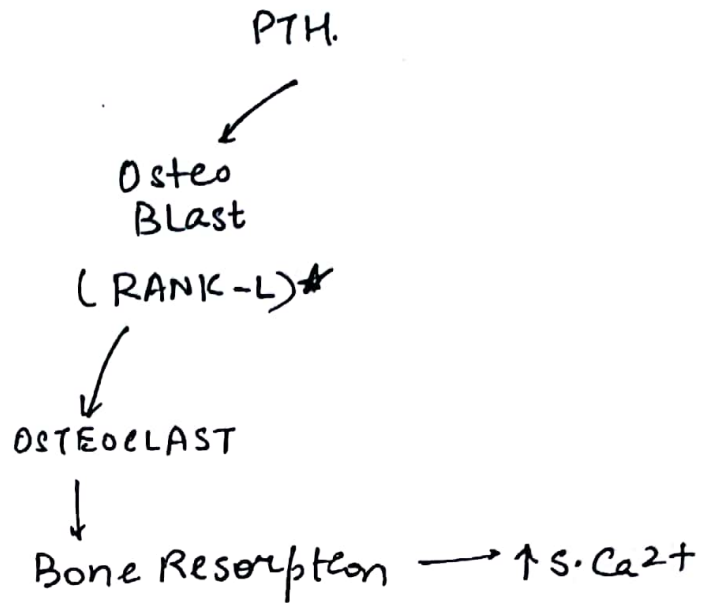


Howship  
 Lacunae

# PHYSIOLOGY

26

CALCITONIN  
↓  
↓ s. Ca<sup>2+</sup>



# ANATOMY

Long Bone has 4 Layers

Epiphysse.

Physi./growth plate

Metaphysis

Diaphysis

# EPIPHYSES

# CLASSIFICATION

- 1) PRESSURE - Body wt bearing  
eg. Head of femur
- 2) TRACTION - attachment of to soft tissues  
eg. Tuberosities (humerus)  
Trochanters (femur)
- 3) ATAVISTIC -  
eg. Coracoid process



## ↳ ABERRANT

27

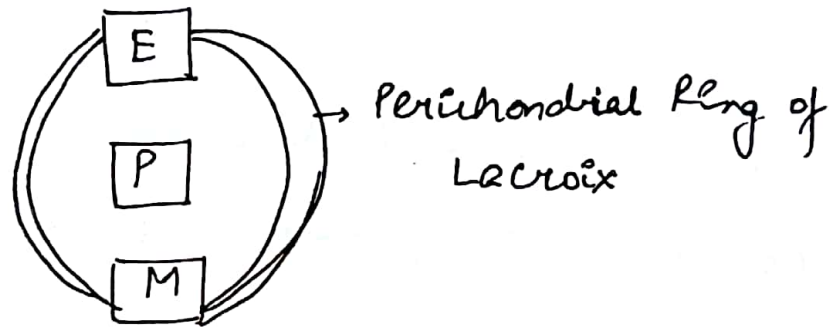
eg. epiphysis @ Head of 1st Mc.

### PHYSIS

#### STRUCTURE

Real People Have Career options.

- 1) Resting zone
- 2) Proliferative zone
- 3) Hypertrophic zone
- 4) Zone of calcification
- 5) Zone of ossification.



### METAPHYSIS

Loose / spongy / cancellous  
Highly vascular

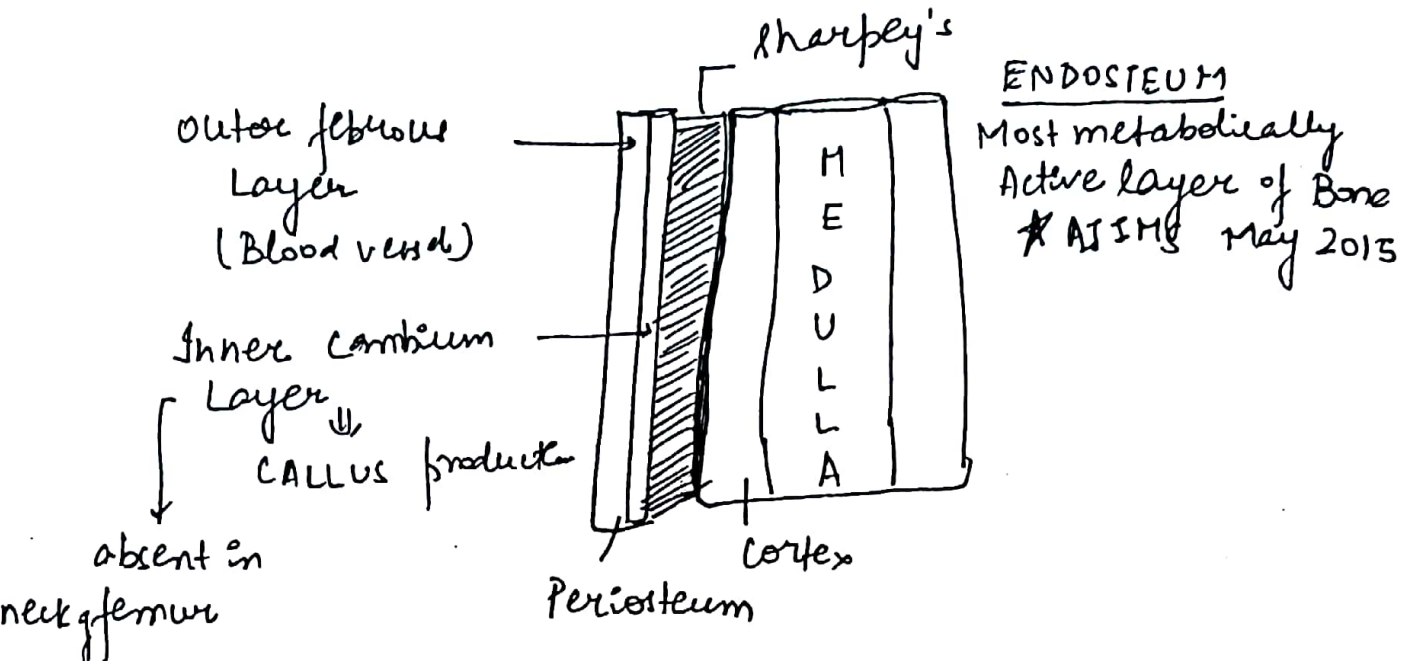
Metaphyseal # → Highest union potential common  
↳ malunion common  
Non-union rare

HAIR PIN LOOP of vessels  
blood vessel → dilated tortuous  
                                ↳ Stagnation of blood  
  ↓  
Ischaemia ← Stasis



↳ Infection → osteomyelitis

DIAPHYSIS/ SHAFT



LIST 10      BASICS (ONE LINER)

Most abundant cell of Bone = Osteocyte

Most long lived cell of Bone      "      "

Clavicle (long Bone) has no marrow cavity

PHYSIS - Temporary 1° cartilaginous joint

HUETER VOLKMANN'S LAW:-

Compressive forces across physis ⇒ INHIBIT GROWTH

Shearing/Tensile forces "      "      ⇒ PROMOTE GROWTH

Ossification centres present @ Birth

- Distal Femur
- Calcaneum
- Talus
- Cuboid



Capitate :- 1st Carpal Bone to ossify  
[@ 2 months] - ATIMS Nov 2017

29

### LAW OF OSSIFICATION

2° ossification centre that appears 1st joins last  
(Fibula doesn't follow this rule)

### METABOLIC BONE DISORDERS

(I) OSTEOGENESIS IMPERFECTA / Brittle Bone Disease /  
Fragilitas Ossium / Morbus Lobstein Disease

COL1A1 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) Bisphosphonate
  - 3) Corrective osteotomy  
(realignment osteotomy)
  - 4) Sofield Meller surgery
  - 5) Internal fixation = Telescopy nail  
Bailey & Dubow Rods.

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

Pre school child

Multiple long bone #s

Signs of violence (+)

X-Ray = METAPHYSICAL #s  
(distal radius/ulna)

CORNER	BUCKET HANDLE #.
--------	------------------

② OSTEOPETROSIS / Marble Bone Disease/

Alberschongberg Disease

Defect in Carbonic Anhydrase II Proton Pump

↓

Defective osteoclastic bone Resorp<sup>n</sup>

↓

Excessive deposition of (N) osteoclastic Bone formation ↓

THICK / DENSE / SCLEROTIC BONE

C/F :- Infants - Bone Marrow failure

31

↓  
Pancytopenia

↓  
Recurrent Infection

↓  
osteomyelitis of mandible

↓  
Hepatosplenomegaly

↓  
Recurrent haemorrhage

X-Ray of long Bone - 2E - Endobones sign  
Erlenmeyer Flask.  
Deformity.

X-Ray spine - RUGGER JERSEY (Renal osteodystrophy)  
SPINE (osteopetrosis)

### III) PAGET'S DISEASE / Osteitis Deformans

High turnover Bone Disease

Excess osteoblastic bone formation  $\bar{c}$

Excess osteoclastic bone resorption

M/C Bone  $\rightarrow$  PELVIS

Age grp  $\rightarrow$  4<sup>th</sup> / 5<sup>th</sup> decade

Asymptomatic in most cases

Western > Asians.

1st M/C Symptom - BACK PAIN

$\Delta$  :- BIOCHEMICAL  $\rightarrow$  ALP  $\uparrow\uparrow\uparrow$



BONE BIOPSY → Gold std.

Mosaic pattern



X-RAY-

OSTEOPOROSIS CIRCUMSCRIPTA

COTTON WOOL SKULL

TAMM-SCHNITZER SIGN

FLAME SIGN / BLADE of GRASS SIGN / ADVANCING WEDGE SIGN



PICTURE FRAME SPINE

BRIM SIGN (thick sclerotic periosteal line)

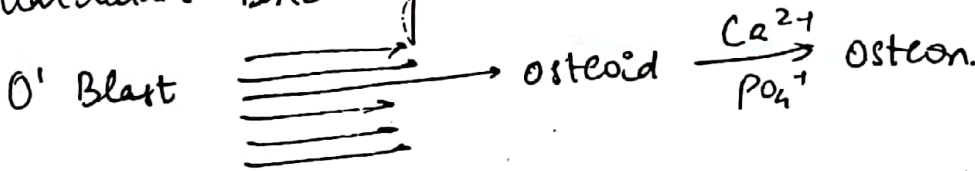
M/c premalignant lesion for 2° osteosarcoma

Doc - Bisphosphonates.

IV

OSTEOMALACIA / MALACOSTEON / Hunger War. Osteopathy

Qualitative Bone defect



Cause-

↓ dietary intake of  $\text{Ca}^{2+}$

Poor GI absorption.

Poor Renal tubular Reabsorption



↓ Lack of properly formed osteon

↓ compensatory ↑ in osteoblastic activity

↑↑ osteoid ↑↑

$$\frac{\text{Osteoid}}{\text{Osteon}} > 1.$$

C/F - young ♀ (15-40yr)

Bone pain

Polyarthralgia.

Proximal myopathy

Hx - spine

### Biochemical Analysis

S.  $\text{Ca}^{2+}$  ↓

S.  $\text{PO}_4^{2-}$  ↓

S. ALP ↑↑↑

### Bone Markers of Formation

Serum levels of Type I collagen

osteocalcin

osteonectin

osteopontin.

X-Ray - SPINE → fish mouth spine



PELVIS → LOOPER'S ZONES. (PAT)

Emil 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  
 Hypophosphataemia  
 Osteogenesis Imperfecta

Mx - 1) Diet rich in Calcium → Milk  
 Green Leafy vegetables

vitD - Cod/fish oil  
 sunlight

2) supplements

## ⑤ OSTEOPOROSIS

1) Porous Bone Disease

2) QUANTITATIVE Bone Defect

M/c R/F ⇒ Post Menopause

M/c cause ⇒ senile / Ageing

Drugs → corticosteroids → Thyroxine  
 → Anticonvulsants → GnRH analogue

↓  
 2° osteoporosis

Excess osteoclastic Bone Resorption > ④ osteoclastic  
 Bone formation.

4F-

Perimenopausal ♀

Mostly asymptomatic

Earliest symptom → BACK PAIN

M/c complication → Pathological #.  
(V. Body of T<sub>12</sub>)

Biochemical Analysis

S. Ca<sup>2+</sup> (N)S. PO<sub>4</sub><sup>2-</sup> (N)

S. ALP (N)

Bone Markers for Resorption

Serum + Urine levels of  
Type I collagen degradation  
products

Phenolene

Hydroxyproline

Deoxypyridinone

N-Telopeptides

C-Telopeptides.

X-Ray - SPINE

→ Fish Mouth spine

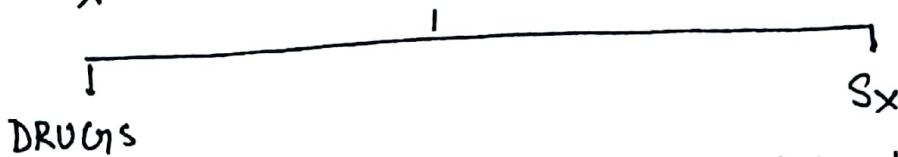


DEXA SCAN - Gold Std

(Dual Energy X-Ray Absorptiometry)

WHO defines osteoporosis →

T-score ≤ -2.5
----------------



- ① Antiresorptives
  - Bisphosphonates (Doc)
  - Denosumab
  - MOA = ⊖ RANK-L

vertebroplasty  
 kyphoplasty (better)  
 ↓  
 percutaneous inj<sup>n</sup> of  
 Bone cement in v Body

② OSTEO PROMOTIVES

Teriparatide

Recombinant PTH in low intermittent dose  
 Doc for Bisphosphonate resistant osteoporosis

③ ANTIRESORPTIVE + OSTEO PROMOTIVE

Strontium Ranelate

FISH MOUTH SPINE ⇒ Osteomalacia > osteoporosis

RUGGER JERSEY SPINE ⇒ Osteopetrosis < Renal osteodystrophy

Less consumption of Bisphosphonate:

Dose

Duration

ADYNAMIC

BONE SYNDROME

Clinical

vague hip pain

X-Ray

Atypical subtrochanteric femur #.

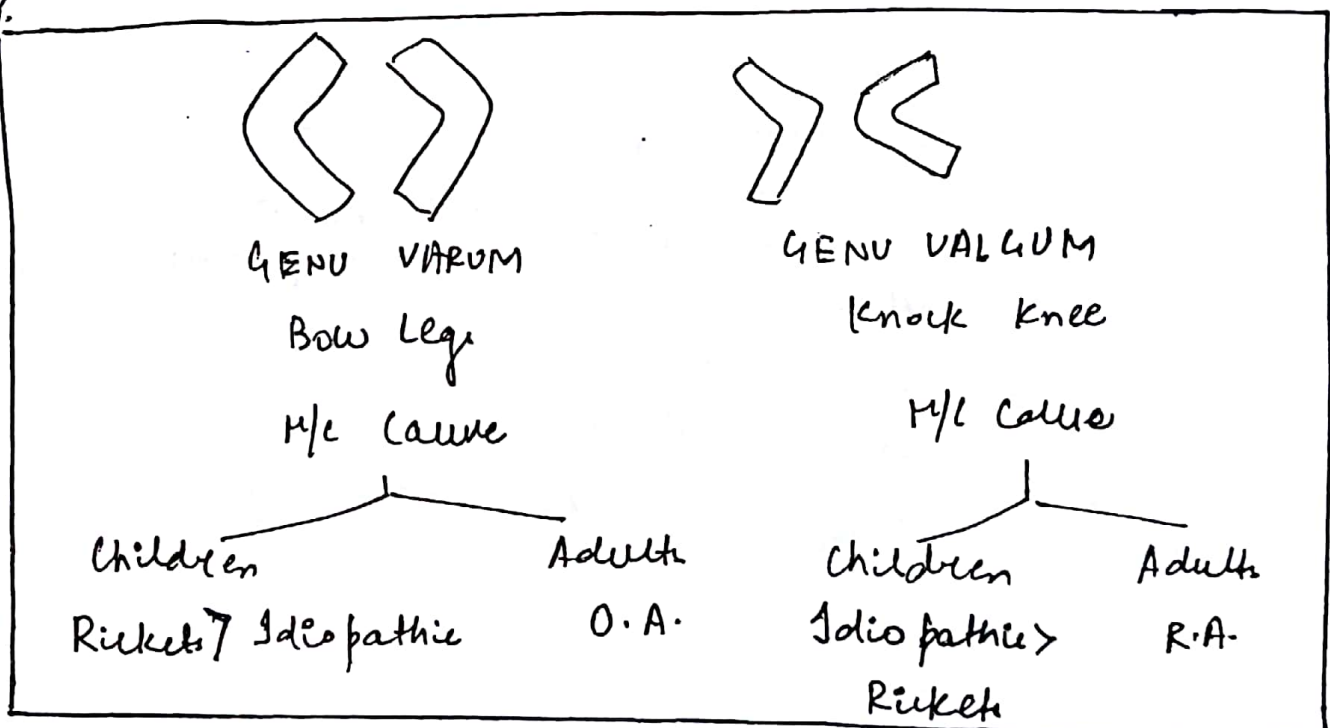




Transverse  
Lateral cortical thickening  
Medial spike  
No comminution

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

Q.



\* Father 2yr child GENU VARUM  
 Rickets Idiopathic  
 $Ca^{2+} \uparrow$   $PO_4^{2-} \downarrow$  Vit D  $\downarrow$  ALP  $\uparrow \uparrow \uparrow$

vit D<sub>3</sub> intramuscular inj<sup>n</sup> of  
 oral Vit D x 6 weeks

6 weeks Later

Genu varum corrects      Genu varum persists  
 ↓  
 Repeat ALP

ALP  $\uparrow \uparrow \uparrow \uparrow$       ALP  $\uparrow$   
 ↓  
 Vit D resistant      Corrective  
 Renal Rickets      osteotomy

ped. nephrologist  
 Rickets { Best Astic → X-Ray  
           Best Prognostic → ALP

# CLAVICLE

39

## ANATOMY

LONG BONE

- Horizontal
- Subcutaneous
- Intramembranous ossification (IMO)
- Two 1° & one 2° ossification centre

1st Bone to start ossifying (5<sup>th</sup> week IUL)

Last " " get ossified

Medial 2/3<sup>rd</sup> → cylindrical

Lateral 1/3<sup>rd</sup> → Flat



Junc<sup>n</sup> of medial 2/3<sup>rd</sup> & Lateral 1/3<sup>rd</sup> = weakest point of clavicle

## FRACTURE CLAVICLE

M/C # overall / delivery / newborn

M/C site - Junc<sup>n</sup> of Medial 2/3<sup>rd</sup> & Lateral 1/3<sup>rd</sup>

M/C complication - Malunion.

Most serious complication - N.V. Injury

→ Subclavian vessel  
↓ ↓  
Brachial plexus  
(lower trunk)

Mx - CONSERVATIVE

∴ Figure of 8 bandage  
Clavicular Brace

# SURGERY → Indications of Sx

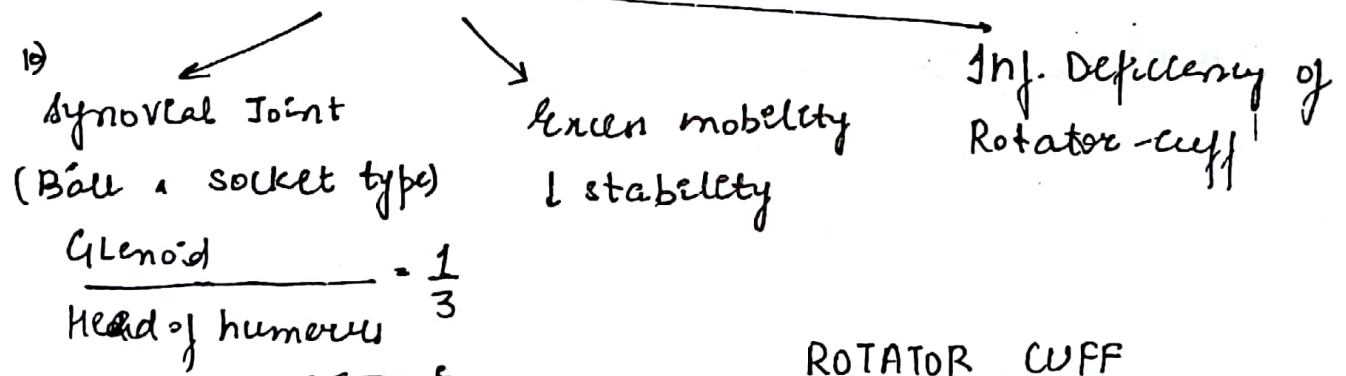
- 1> N.V. Injury
- 2> # @ Lateral end of clavicle & A.C. Joint disruption
- 3> cosmetic defect
- 4> Floating shoulder  
(I/L scapular/glenoid neck #  
mid shaft clavicle #)

## SHOULDER JOINT

### ANATOMY

M/C Joint to undergo dislocation shoulder

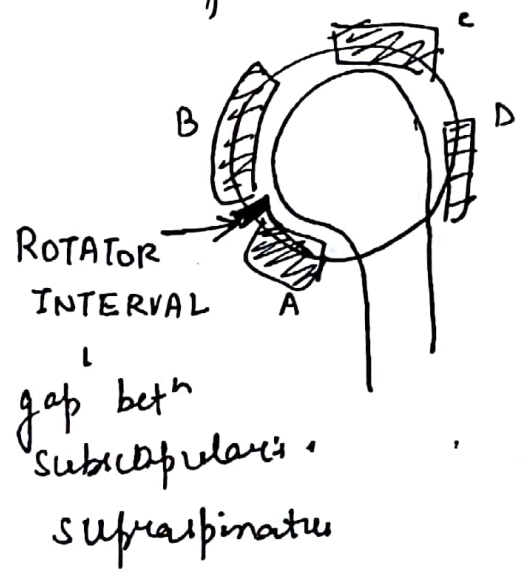
WHY?



### ROTATOR CUFF

Capsule +

- (A) Subscapularis → Lesser Tubercle  
↳ Mixed / forgotten m/s I.R. @ shoulder
- (B) Supraspinatus → 0-15 Abduction
- (C) Infraspinatus → Greater Tubercle
- (D) Teres Minor → E.R. @ shoulder



# SHOULDER STABILISER

41

## STATIC

- 1) Capsule
- 2) Glenoid Labrum ~ (50%)
- 3) Negative intraarticular pressure
- 4) Glenohumeral ligament
  - ↳ S.GHL → 0° Abduction
  - ↳ M.GHL → 45° "
  - ↳ I.GHL → 90° " \*\*\*\*

## DYNAMIC

- 1) Rotator cuff  $\approx$  v imp
- 2) Deltoid
- 3) Biceps

## TRAUMA AROUND SHOULDER

### SHOULDER DISLOCATION

#### CLASSIFICATION

M/c subtype	A.S.D.	P.S.D.	I.S.D.
↓ subcoracoid	>>>	>	
	(95-98%)	(3-4%)	(1-2%)
Mech. of Injury	Abd <sup>n</sup> ER	Add <sup>n</sup> IR	Hyperabduc <sup>n</sup>
Examples	Vigorous throwing of Ball	[ Epilepsy [ Electric shock	Pt. locks arm by side of head (salute posture)
	PAINFUL	Minimally painful/painless	



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-

Paraaxillary palpation of Head of humerus

HAMILTON RULER TEST-

Ruler touches both acromion + Lateral condyle simultaneously

### COMPLICATIONS

M/C (Overall) → Recurrent

M/C (Immediate) → Injury to circumflex Br. of Axillary N<sup>v</sup>

M/C (delayed) → Recurrence

Mx- Closed Reduction.

\* Methods of CR -

- 1) Hippocratic method
- 2) Stensons Gravity Technique
- 3) Modified Kocher Technique (TEA-1)  
[Traction - ER — Adduction → IR]

# RECURRENT SHOULDER DISLOCATION

43

## MATSEN'S CLASSIFICATION

### TUBS

Torn Loose

(T) Traumatic

(U) Unidirectional

M/C → Ant.

(B) Bankart's Lesion

\* Avulsion of Ant. Inf. glenoid Labrum

\* M/C cause of Recurrent ASD.

### HILLSACH'S LESION

\* Bony defect @ posterolateral aspect of Head of Humerus due to repeated impaction against glenoid

\* 2<sup>nd</sup> M/C cause of Recurrent ASD.

(S) Surgery

↳ Arthroscopic Bankart/  
Hillsach's

### AMBRI

Born Loose

(A) Traumatic

(M) Multidirectional

FULCRUM Test - Ant. Instability

JERK test → Post. Instability

Sulcus test - Inf. >>

(B) Bilateral

MRI → capsular laxity

Connective tissue disorder

Moufan / Ehler Danlos variant

(R) Rehabilitation.

Isometric Rotator

Cuff strengthening exercise

(I) Internal Capsular closure

# CAUSES OF RECURRENT PSD

44

## \* 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)

(Opp. to Hillsach literally)

## ROTATOR CUFF TEAR

young ♂ (20s/30s)

Pain  
swelling } (R) shoulder

o/e - Limitation of initiation of Abdu<sup>n</sup>

1st Inv = USG

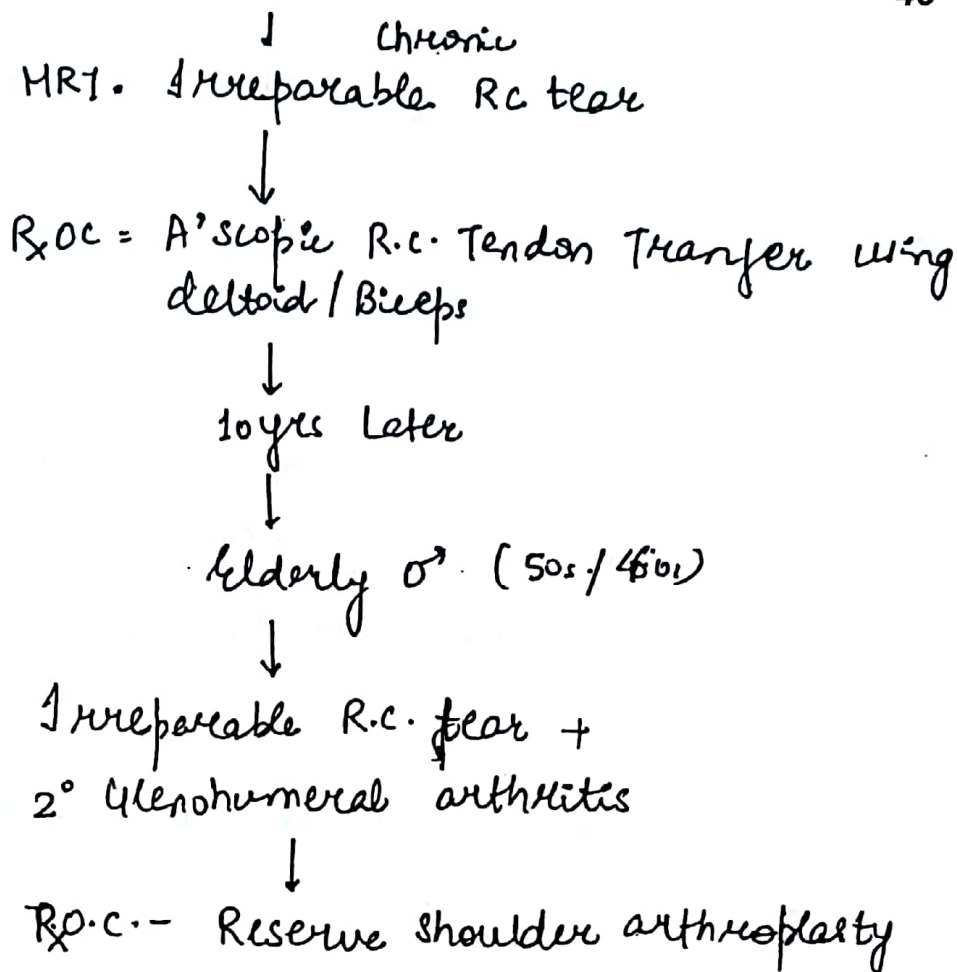
IOC = MRI

Acute Traumatic R.C. Tear

Toe: Arthroscopic R.C. Repair

10yrs Later

young ♂ (30s/40s)



### LIST- 11

M/C #

Overall = clavicle

Newborn - clavicle

Delivery - clavicle

Difficult Delivery - Humerus

Children - Greenstick # (Radius > Ulna)

Children around elbow - supracondylar # Humerus

M/C CARPAL BONES - # → Scaphoid

Dislocation → Lunate

M/c - TARSAL BONES

46

# - Calcaneum

Dislocation - Talus.

M/c Bone

open # - Tibia

Pathological # - v Body (T12)

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

M/c Joint to undergo ~~shoulder~~ dislocation = Shoulder

LC " " " = Knee

M/c Joint to undergo Recurrent " = Shoulder

L/c " " " = Ankle

M/c - Tendon Injury supraspinatus > Tendinopathy

M/c Ligament to undergo strain A-T.F.L.  
(ant. talo fibular lig)

STRONGEST LIGAMENT = BIGELOW'S Lig  
Iliofemoral lig (IFL)

M/c Peripheral N/v Injury - Radial n/v

Best Prog (PNT) = Radial n/v

Worst Prog (PNT) = Ulnar n/v

Worst Prog despite sx = Scapular n/v  
Repair



M/c # due to Fall on Outstretched HAND  
(F.O.O.S.H.)

children = S.C. # Humerus

adults = # Scaphoid

Elderly = Colle's #

M/c Arterial Injury = Popliteal

LARGEST CARPAL BONE = Capitate

1st carpal Bone to ossify = Capitate

M/c Joint to undergo Dislocation in children  
= Elbow

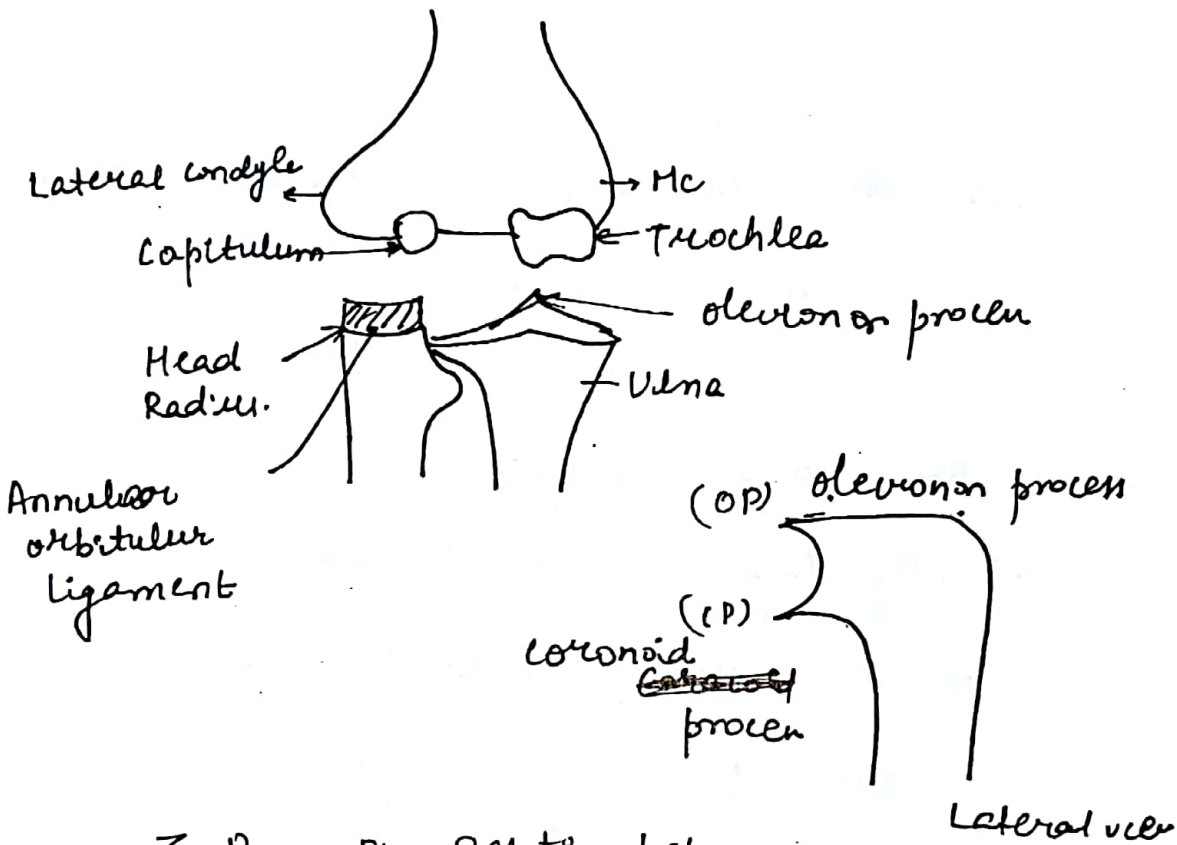
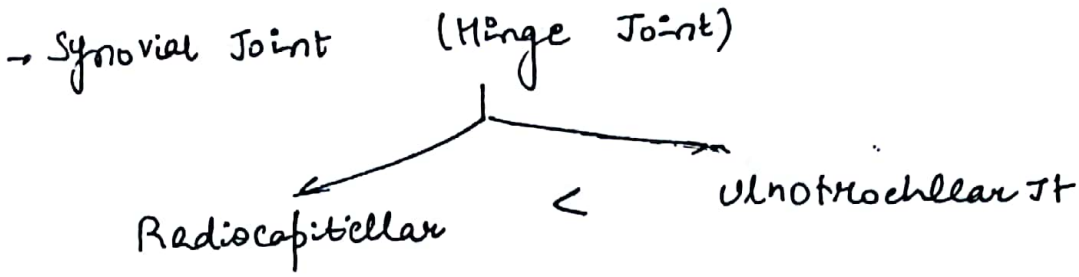
4c Carpal Bone # = Trapezoid

Most centrally located Carpal Bone = Capitate

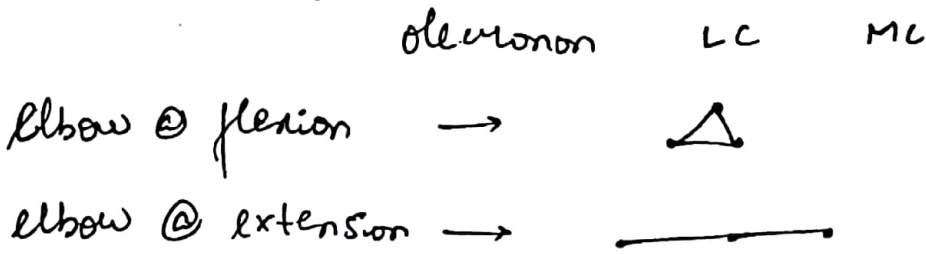
M/c Tarsal Bone to develop stress # = Navicular.

Last Carpal Bone to ossify = Pisiform

# ELBOW JOINT



3 Bony Pt. Relationship



ALTERED - # LCH / # MCH / # olecranon

NORMAL - SC # H.

# SALTER HARRIS CLASSIFICATION (I-V) 49

I

No obvious # line

Minor - major physal slip

eg. slipped capital femoral epiphysis

II

Extra-articular injury

Triangular metaphyseal Bone fragment

(Thurston Holland sign)

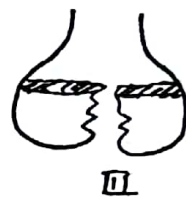
eg. SC # Humerus

III

Intra-articular injury

Physal # line extending into epiphysis

eg. lower end of Tibia #



IV

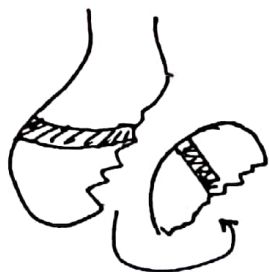
2<sup>nd</sup> MC type

Intra-articular injury

Rotation of distal fragment

↳ articular surface become non articular & vice versa

eg # LCH # of necessity ⇒ ORIF is compulsory



V

Worst prognosis

Least common type

due to fall from height

Initial x Rays (N)

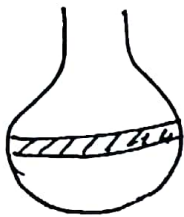
partial / complete physal crushing injury

IOC = MRI



Complications:- Growth disappear  
Limb length deformities

RANGI - VI Injury to Perichondrial Ring of  
La' Croix.



## FRACTURES OF DISTAL HUMERUS

### (A) SUPRACONDYLAR # HUMERUS

M/C # due to F.O.O.S.H. in children

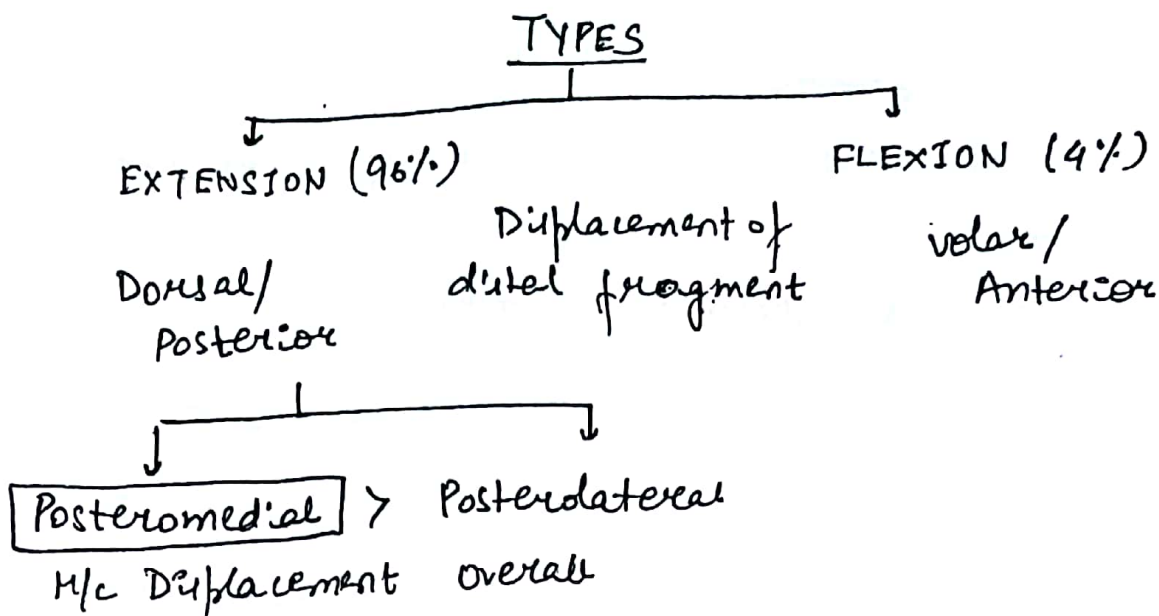
MC # in children around elbow

Salter Harris type II

Extra-articular #

Three Bony pt Relationship (N)

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



GARTLAND'S CLASSIFICATION

(I)	(II)	(III)
Minimally displaced undisplaced Impacted # X-Rays (N)	Unisortial Angulation (+) No displacement	Complete # Bicondylar # Completely displaced #
Mx Above elbow POP slab/cast x 3 weeks	CR + Above elbow POP slab/cast	CR + K-wire Fixation

COMPLICATIONS of SC#H

- 1) M/c Malunion → CUBITUS VARUS (Gunstock Deformity)
- 2) Neurological injuries
- 3) Vascular injury (MC = Brachial artery)
- 4) Compartment
- 5) Volkmann's Ischaemic contracture
- 6) Myositis ossificans



# CUBITUS VARUS

- Gun stock Deformity
- Malunited SC #H most commonly complicate this way
- occurs due to Uncorrected medial Tilt
- static deformity
- cosmetic "

→ Mx FRENCH OSTEOTOMY Modified French osteotomy

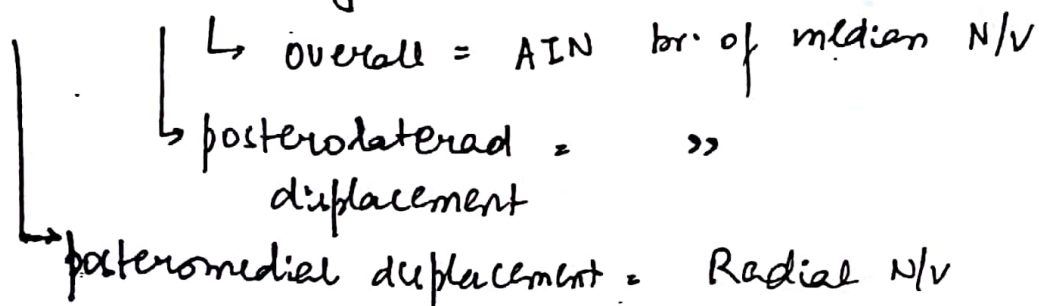
post midline	<u>Incision</u>	posterolateral
Whole Triceps	Triceps detachment	Lateral Triceps
explored, kept safe	Ulnar N/V	Not explored
Broken	Medial cortex	Intact

## NEUROLOGICAL INJURIES in SC #H

usually neuropraxia

Recover Transiently

M/C Nerve Injured in SC #H



COMPARTMENT SYNDROME

ETIOLOGY

↑ contents

↓ size

- 1) Bone :- #
- 2) M/c #  
children = SC # H  
adults = # prox. Tibia

- 1) Tight circumferential  
POP dressings/casts
- 2) Post Burn contractures

- 3) Muscle → crush  
Traumatic Rhabdomyolysis
- 3) Vessel → vascular injury

e/f :- " 7P "

1st Symptom = Pain.

1st sign = Pain on passive stretching [Most Δste/  
sensitive] (STRETCH TEST +ve)

Pallor

Paraesthesia

Paralysis

Pulselessness

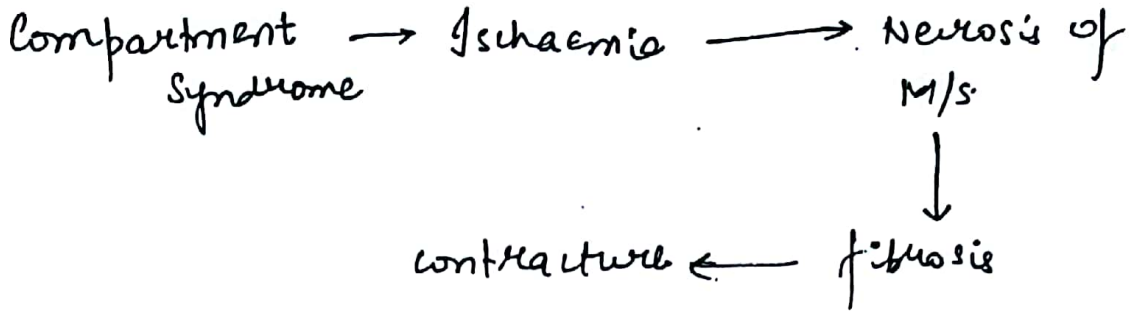
→ late feature  
→ Not Δste criteria

Pressure ↑↑↑ (N) 6-12 mmHg

Δste ≥ 30 mmHg

Mx = fasciotomy

V.I.C.



Volkman's Deformity

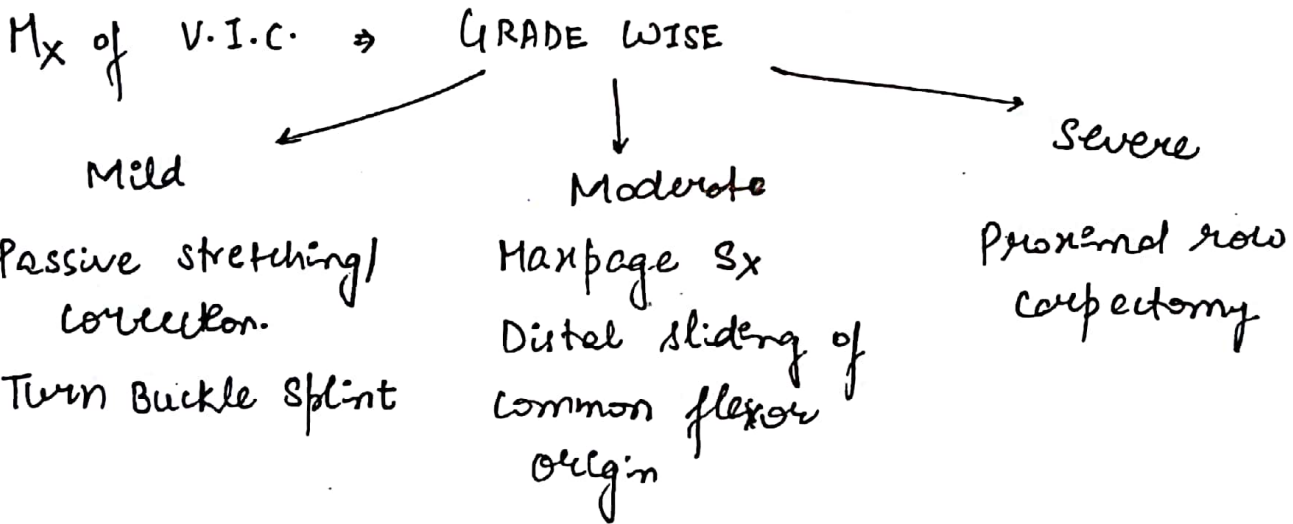
Forearm → Thinned / atrophied

Wrist → flexed

Palm → Hollow

MCPJ → Hyperextended

PIPJ → Flexed



MYOSITIS OSSIFICANS

Minomere (no m/s inflammation)

Heterotrophic ossification.

Ectopic, benign, pathological bone formation in soft tissue

## ⇒ 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

fatal cond<sup>n</sup>

children < 6yrs

Microdactyly

Bone formation in cardiac M/s

Diaphragm, Tongue, EOM M/s spared

Death due to resp failure

M/C Joint involved in Myositis ossificans = Elbow > Hip.

## (B) # LATERAL CONDYLE HUMERUS

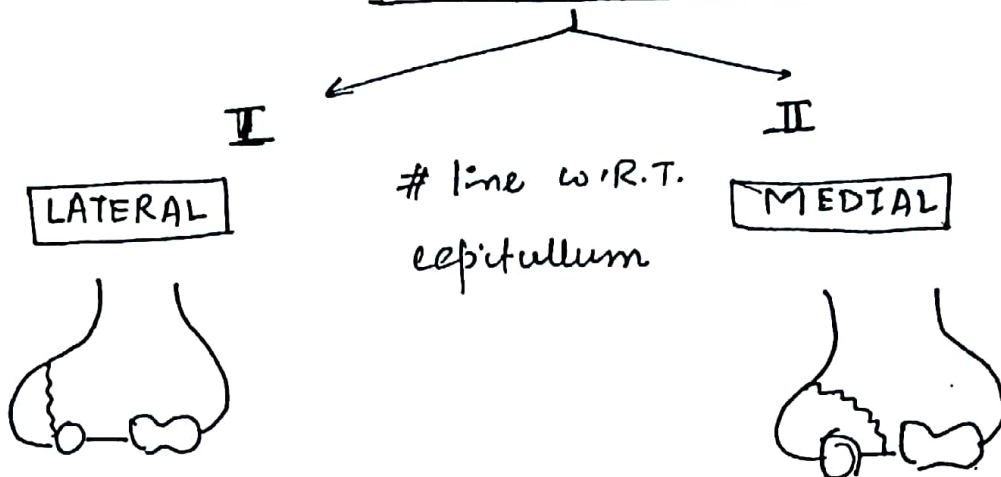
Intra-articular

Salter Harris type II

3- Bony Point Relationship ALTERED

Less common in incision than SC #H

## MILCH CLASSIFICATION



M/C Comp<sup>n</sup> - Lateral spur formation.  
due to ossification under periosteum

M/C complication Requiring Rx = NON UNION  
↓  
Cubitus Valgus  
Dynamic  
Functional

Mx = Milch Osteotomy.

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

Mx = # Lateral condyle humerus is # of necessity  
ORIF is the only Rx possible



# # SHAFT OF HUMERUS

57

## HOLSTEIN LEWIS #

oblique, displaced # of shaft of humerus @ Junct<sup>n</sup>  
of upper  $\frac{2}{3}$ <sup>rd</sup> + Lower  $\frac{1}{3}$ <sup>rd</sup> of shaft =  
Radial N/V ~~inj.~~ Palsy.

## LIST- 12 & CLASSIFICATION IN ORTHOPAEDICS

Graff's - DDH  
(USG)

Kashiwagi (HRT) = DDH

Stulberg's  
Catterall

Satter Thompson

Herrings



~~Atke~~ Aitken's - Prox. femoral focal deficiency

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

↓  
Congenital pseudoarthrosis  
of Tibia

Steinberg's = A.V.N.

BADOS - Monteggia's #

Mason's - # Head Radius

MATSENS - Recurrent shoulder dislocation

NEER'S - # proximal humerus

Bayne & Klug - Radial Club Hand

Arnold & Hilgartner's - Hemophilic arthropathy

outerbridge's Articular cartilage arthritis

Ahlback's - OA knee

Rockwood - Acromioclavicular Joint

Judgt + Letournel - # Acetabulum

Wingquist + Hansen - # SOF

Schatzkers - # prox. Tibia

\* Hawkins - # Neck Talus

Sanders (CT) - # calcaneum

Essex Lopresti - (X-Ray) # Calcaneum

Allman's

Frykman's

Fernandez

Melones

# distal end of radius

Teles

Young + Burgess

Pipkins

# pelvis

→ # head femur

Salter + Thompson's - Perthes disease

Salter + Harris - Physeal Trauma

Thompson + Epstein - Post-Hip Dislocation

List- 13 # / INJURIES = Eponyms (Elbow/ forearm/ wrist)

1) Pulled Elbow / Nursemaid's Elbow.

Distal subluxation of Head of Radius  $\rightarrow$  widening of  
Radio capitellar Groove

$\downarrow$   
Annular/ orbicular ligament gets stuck & widened  
radio capitellar groove

$\downarrow$   
 $\rightarrow$  child locks elbow in extension & doesn't allow  
anyone to touch.  $\rightarrow$  Apprehension test +ve

Mx = Closed Reduction

2) HOTCH KISS & TERRIBLE TRIAD

Post. elbow subluxation/ dislocation

# Head Radius

# Coronoid process of ulna

3) ESSEX LOPRESTI # DISLOCATION

Distal Radio Ulnar Jt. Disruption

Interosseus membrane disruption.

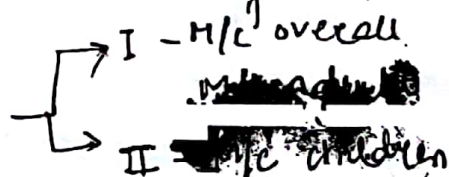
# Head Radius.

4) MONTECATI's #

# of proximal one third of ulnae shaft +  
Radial Head dislocation.

BADO's classification (I-IV)

H/L N/v Injured - P.I.N.



# of necessity (ORIF is compulsory)

60

5) GALEZZI'S # / REVERSE MONTEGGIA'S # /  
PIEDMONT #

# shaft of Radius @ Junc<sup>n</sup> of middle + distal  $\frac{1}{3}$ <sup>rd</sup> of shaft  $\bar{c}$  D.R.U.J<sup>t</sup> disruption.

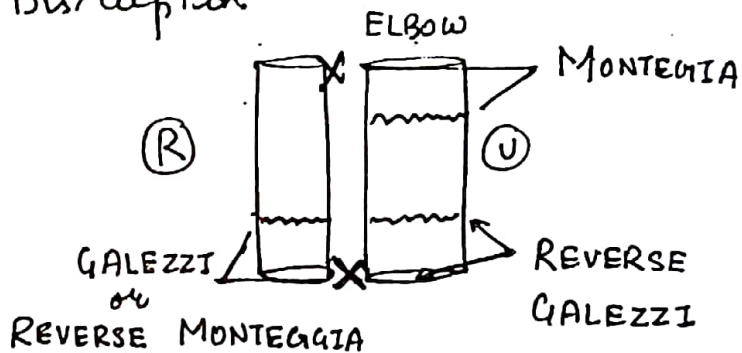
# of necessity (ORIF is compulsory)

3 times more common than Monteggia's #

6) REVERSE GALEZZI'S

# of shaft of ulna (@ Junc<sup>n</sup> of middle, Distal  $\frac{1}{3}$ <sup>rd</sup>)  $\bar{c}$  D.R.U.J<sup>t</sup> Disruption

7) LAUGIER'S #  
# of Trochlea



8) HUME'S #

→ # of olecranon (prox. ulna)  $\bar{c}$  ant. elbow of dislocation of Radial Head

→ Monteggia's variant

9) NIGHTSTICK #

Isolated # of shaft of ulna

[MOT] - direct trauma to forearm while in a defensive stance

10) GREENSTICK #:

~~in~~ children.

unicortical # of forearm bones

(Radius & ulna)  $\bar{c}$  concavoconvex deformity



11) BARTON'S #

Intra-articular # of distal end. radius (DER)  $\bar{c}^{61}$   
 Radio-carpal joint subluxation.

\* Barton's Disease  $\leftarrow$  Vit C ↓ swelling  
 Vit D ↑ Rickets

12) CHAUVEFFER'S # / HUTCHINSON # / BACKFIRE #

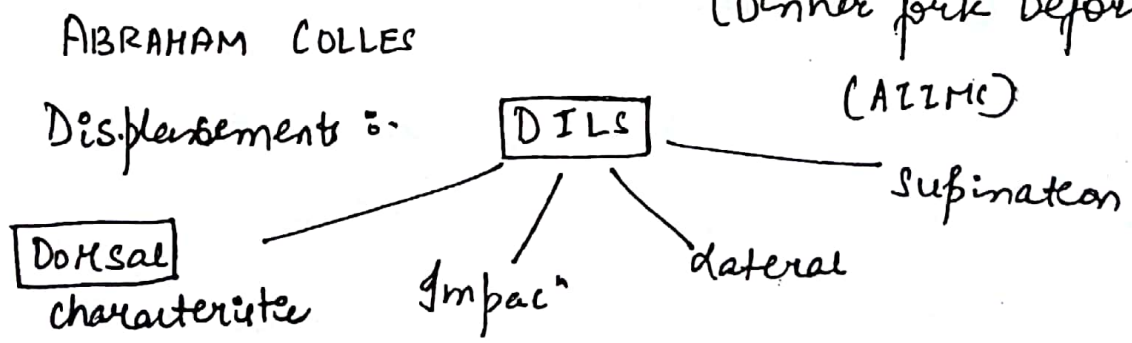
Intra-articular # of distal end of radius  $\bar{c}$  #  
 Radial styloid process.  
 Radio carpal Jt. (N)

13) SMITH'S # / REVERSE COLLES'S

Extra-articular # of distal end of Radius  $\bar{c}$   
 volar/anterior displacement of distal fragment  
 H/c Comp<sup>n</sup> - Malunion (Garden spade deformity)

14) COLLE'S #

Extra-articular # of distal end of Radius  $\bar{c}$   
 dorsal/posterior displacement of distal fragment  
 (Dinner fork Deformity)



Complications of Colle's #

a) H/c  $\rightarrow$  finger stiffness

b) 2<sup>nd</sup> H/c  $\rightarrow$  Malunion (Dinner fork deformity) pseudo-madelling



- c) Carpal Instability
- a) carpal tunnel
- e) Rupture of extensor pollicis longus
- f) Post. Traumatic shoulder ~~stiffness~~
- g) Sudeck's osteoneurodystrophy  
(reflex sympathetic dystrophy)

Mx - COLLE'S CAST (Hand shake cast)

- ✓ 15° pronation
- ✓ 15° palmar flexion
- ✓ 15° ulnar deviation

### 15) SUDECK'S OSTEONEURODYSTROPHY

Reflex sympathetic dystrophy

CRPS I (Complex Regional Pain Syndrome)

- ↳ (I) Bony / soft tissue injury
- ↳ (II) N/v injury

Rare / delayed complication of Colle's #

Pain (severe / intense) out of proportion

swelling (stiffness / thin, shiny + stretched skin)

Hyperaesthesia

Uninhibited v sympathetic stimulation.  
~~over~~ over

X-Ray = Osteopenia ( $\uparrow$  blood flow in sympathetic stimulation) <sup>63</sup>

Mx = 1) Sympatholytics

2) NSAIDs/ M/s Relaxant (amitriptyline)

3) Sympathetic Ganglion Blockade

4) Surgical Sympathectomy

5) Vit C = prophylactic Role

## 16) # SCAPHOID

M/c Carpal Bone #

M/c # due to FOOSH in adults

Retrograde blood flow  
(distal  $\rightarrow$  proximal)

M/c mode of injury  $\rightarrow$  FOOSH

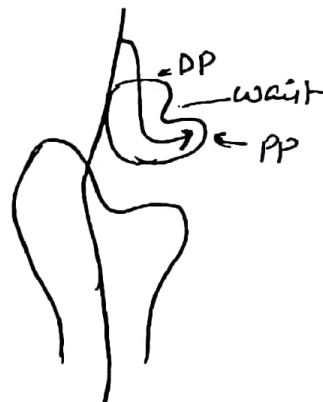
M/c site  $\rightarrow$  waist

Scaphoid = floor/Base of anatomical snuff Box

C/f- Tenderness / swelling in anatomical snuff Box

X-Ray - Oblique

PA view in  $15^\circ$  Ulnar Deviation.



M/c Complication - NON UNION.

2nd M/c " - AVN of prox. pole

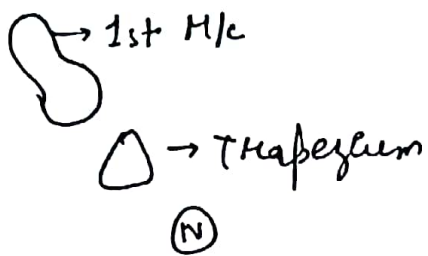
Mx - { undisplaced #  $\rightarrow$  scaphoid/ Glass holding cast  
displaced #  $\rightarrow$  O.R.I.F. & Herbert screw

## 17) BENNETT'S

I/A # of 1st Mc

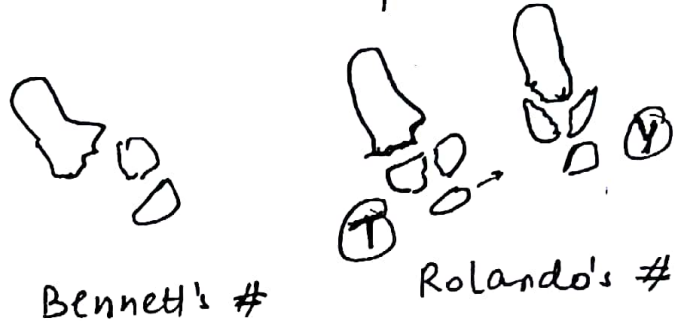
OBLIQUE

more displaced



## 18) ROLANDO'S #

I/A # of 1st M/c

# / Y shaped comminuted  
# less displaced

## 19) BOXERS

# Neck of 5<sup>th</sup> Metacarpal  
(M/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 (ULC)  
from 1st metacarpophalangeal Jt.

## 23) MADELUNG DEFORMITY

B/L paediatric congenital deformity

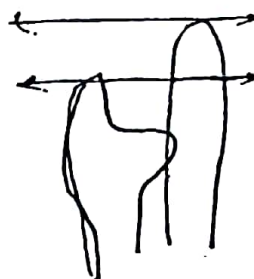
Growth retardation of ulnar aspect of distal end of radial physis.

DISTAL ULNA:- Thick prominent

⊕ Ulnar variance

Dinner Fork Deformity

Mx = osteotomy  
(DARRACH'S PROCEDURE)



⊕ ULNAR  
VARIANCE

ulnar plus  
deformity



⊖ ULNAR  
VARIANCE

Ulnar  
minus  
deformity

## 24) RADIAL CLUB HAND

Longitudinal Deficiency Disorder

complete absence of radius > partial absence of radius.

1st/2nd metacarpal / scaphoid / Trapezium = Absent

BAYNE & KLUG CLASSIFICATION

B/L paediatric Congenital deformity

⇒ Syndromic Associations (Pb1)

TAR Syndrome = Thrombocytopenia  
Absent Radius

HALT ORAM Syndrome = ASD

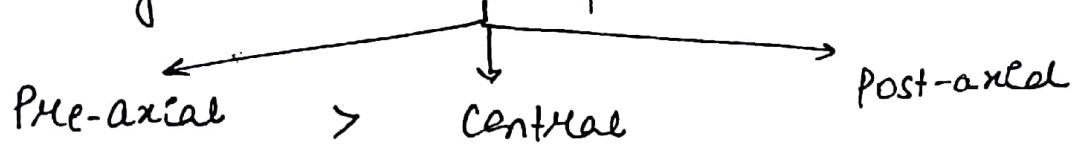
fancioni's anaemia  
Radial club hand

VACTER Syndrome = (V)ertebral anomalies  
(A)nal Atresia

(TE) Tracheo-oesophageal fistula  
(R)enal + (R)adial dysplasia

25) POLY DACTYLY

M/C Congenital/Hand malformations



Thumb

26) SYNDACTYLY

fused/conjoined/webbed fingers



(Syndactylism)

M/C sites:- Middle + Ring fingers

Apert's Syndrome - Craniosynostosis

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

27) PREISER'S DISEASE

Non traumatic AVN of Scaphoid



## 28) KEINBOCK'S DISEASE

67

pressure osteochondritis non-traumatic AVN  
of LUNATE

## 29) KAPLAN INJURY

Irreducible dislocation of ~~metacarpal~~ (M/C-IF)  
@ MCP JB Index finger

### LIST-14

### TESTS IN ORTHOPAEDICS

Pen Test - Abductor Pollicis Brevis (MN)

Card Test - Palmar interossei (UN)

Eliawan's Test - Dorsal interossei (UN) → hold the fingers & ask to abduct

Book Test / Froment's sign - Adductor pollicis (UN)

PHALEN'S TEST Carpal tunnel syndrome

DURKAN'S TEST " "

COZEN'S TEST - Tennis elbow (Lateral epicondyle)

YERGANSSON'S TEST - Bicipital Tendinitis

LIFT OFF TEST - Subscapularis

DUBAS TEST

CALLAWAY'S T

HAMILTON RULER T

} → Ant Shoulder Dislocation

FINKELSTEIN'S T - De Quervain Tenosynovitis

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

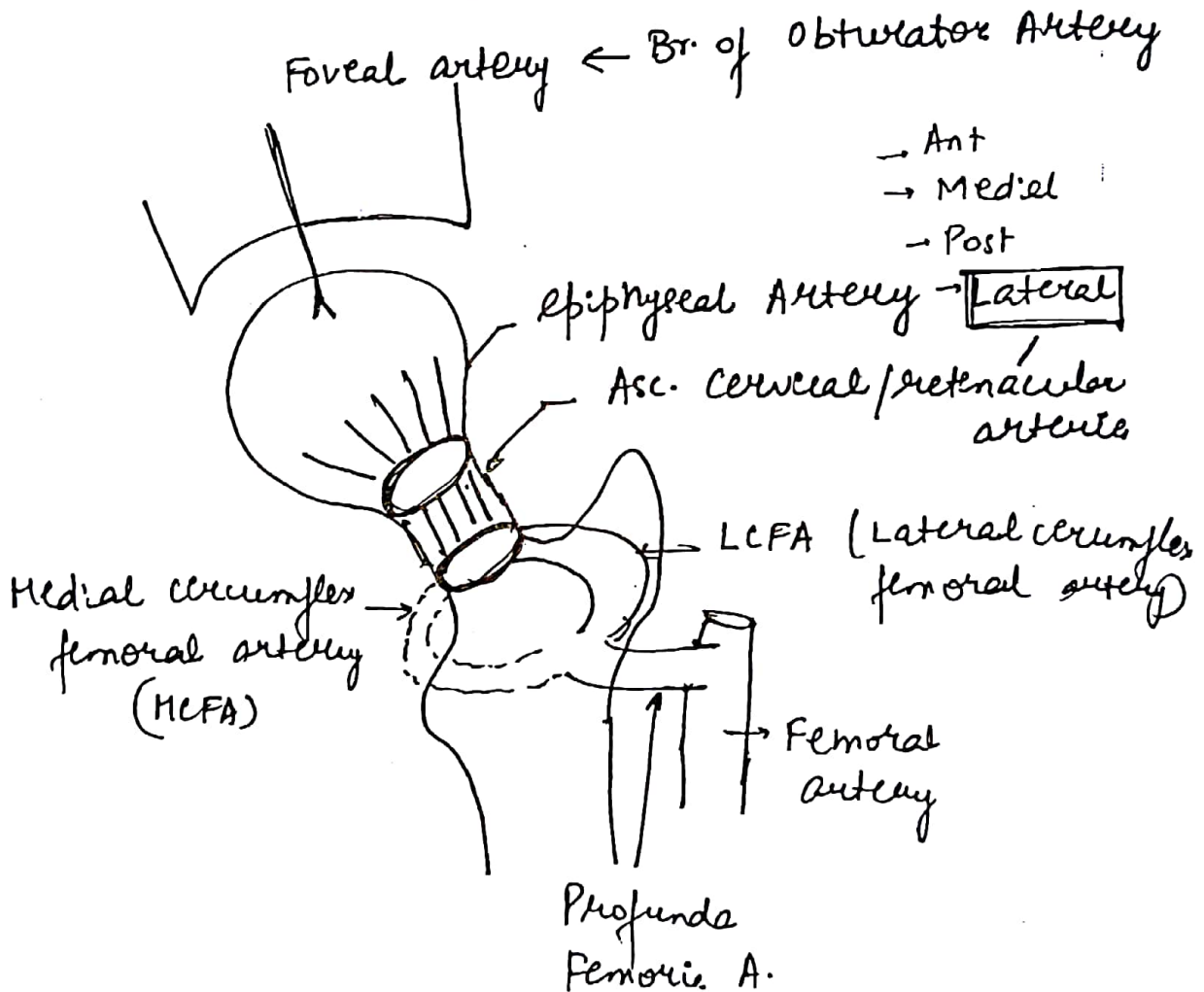
SIMMOND THOMPSON T - tendoachilis tear  
Tendinctor / tear

HIP JOINT

ANATOMY

BLOOD SUPPLY

Retrograde (distal - proxima)



## LURCH

Painless

Diseased side ← Trunk Deviate towards

Developmental Dysplasia of Hip

Polomyelitis

Sup. Gluteal N/v Palsy

U/L Trendelenberg's Abductor/Lurching gait

B/L Duck Waddling gait

## LIMP

69

Painful

→ (N) side

Septic arthritis

Transient Synovitis Hip.

U/L Antalgic/Limping Gait

B/L Not applicable

## 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 supra-trochanteric 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 1<sup>st</sup> to Hilgenreiner's Line

#### 4) PERKIN'S QUADRANTS

70

Intersection of above two lines.

(N) Location of Head of femur  $\left\{ \begin{array}{l} \text{Inner} \\ \text{Lower} \end{array} \right.$

DDH  $\left\{ \begin{array}{l} \text{upper} \\ \text{outer} \end{array} \right.$

#### 5) KLEIN'S LINE

Line along superior surface of Neck of femur  
 $\perp$  (N)ly intersects Head of femur But in  
SCFE (slipped capital femoral epiphysis), it doesn't  
intersect head of femur

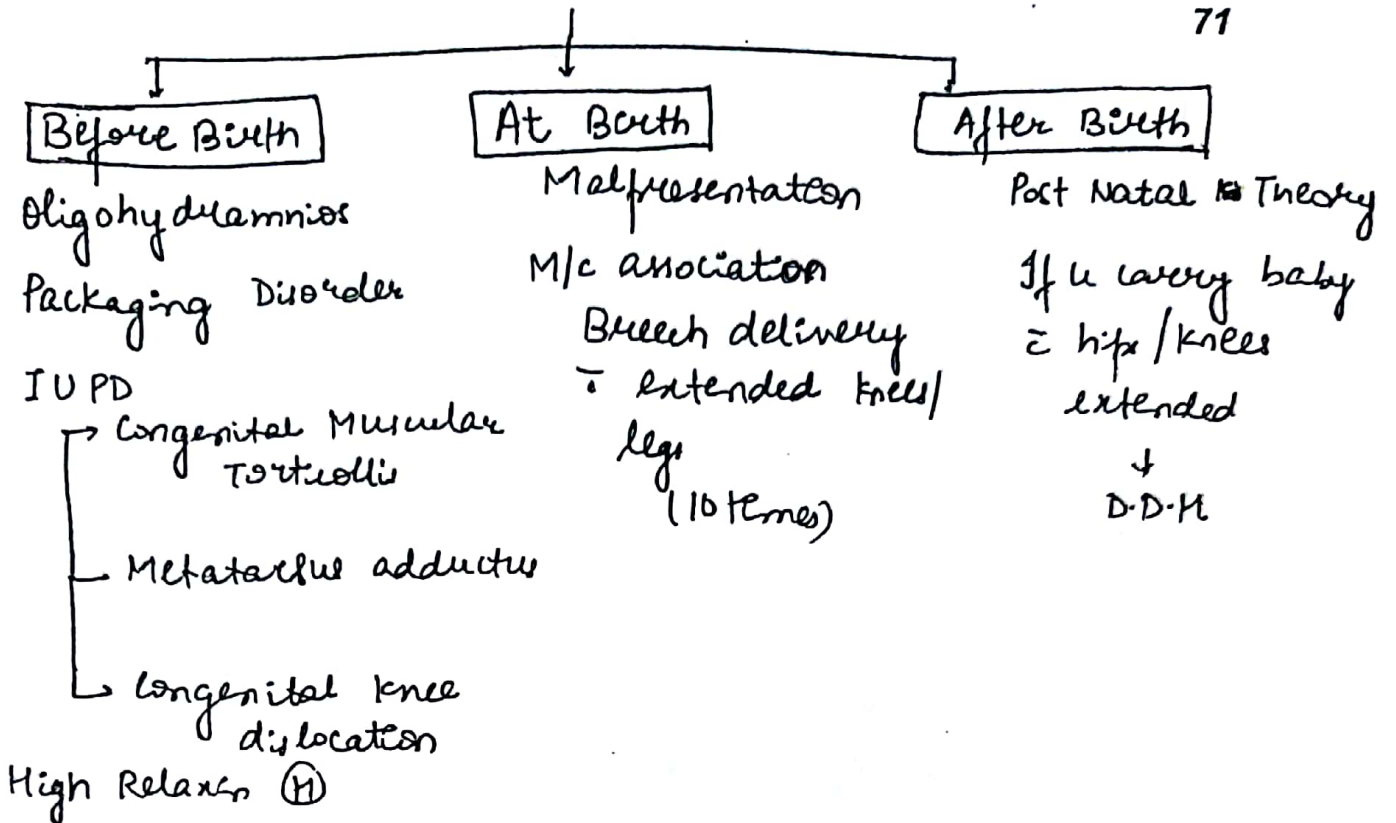


POSITIVE TRETHOWAN'S SIGN  
(frog leg Lateral view)

### PAEDIATRIC HIP DISORDER

#### (A) DEVELOPMENTAL DYSPLASIA OF HIP

Def<sup>n</sup> :- Idiopathic spontaneous subluxation / dislocation of  
Head of femur from Acetabulum.



STATISTICS:

Incidence = 1/1000 live births

Western > Asians

♂: ♀ = 1:7 (♀ >> ♂)

B/L = 20%

Amongst U/L case = Left > Right  
 overall sequence = Left > B/L > Rt

Five 7s

- ♀ child
- 1st born ♀ of family
- Fair complexion (white/western)
- Family History
- Faulty Intrauterine Position

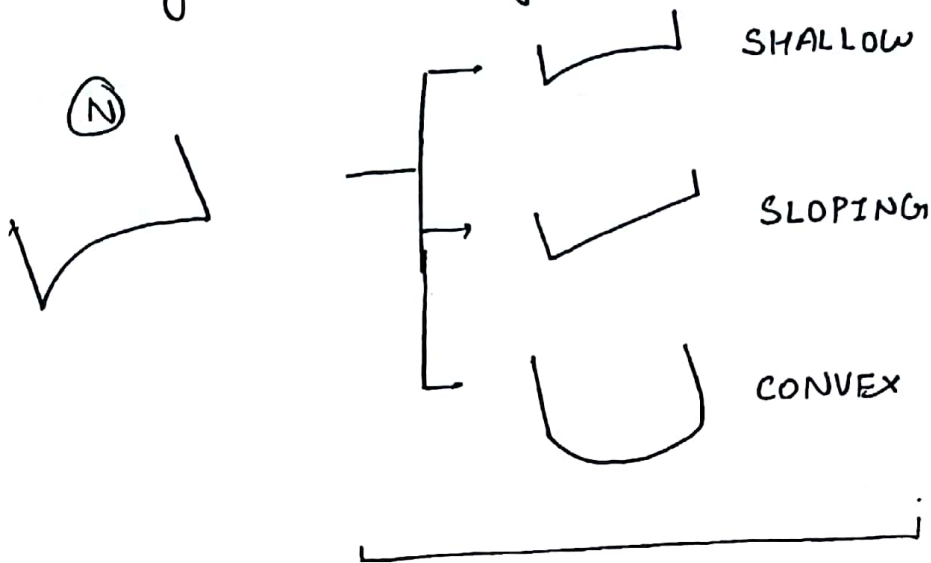
M/C cause - Idiopathic

M/C association - Breech delivery = extended knees + legs



Pathogenesis :-

Dysplastic Acetabulum

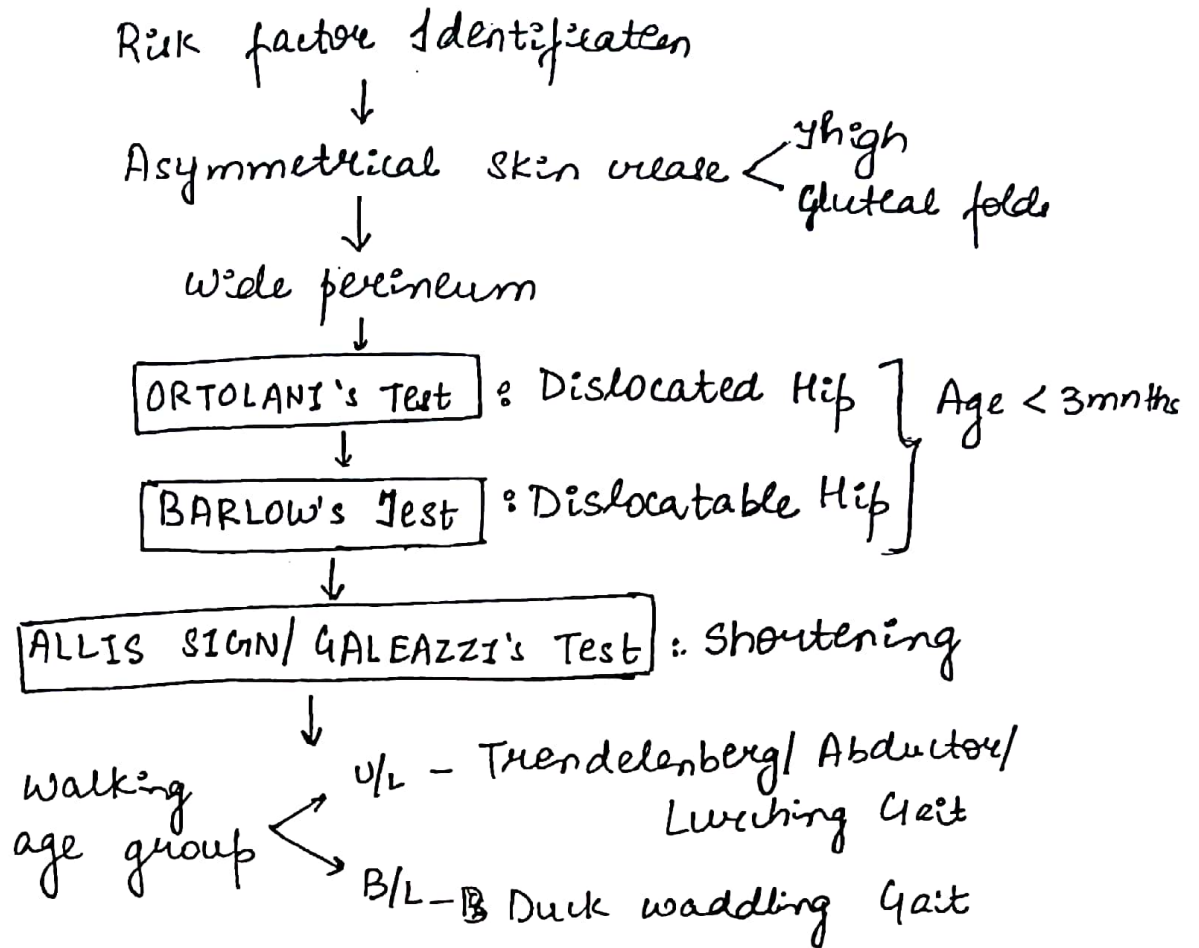


upward • Lateral subluxation of / dislocation of Head of femur

SHORTENING.

- \* Hypertrophied, Inverted, infolded, Acetabular Lesion Labrum (fibrocartilage) (Inverted Limbus Sign)
- \* Hypertrophied fibrofatty tissue (PULVINAR) fills up empty acetabulum
- \* Hypertrophied ligamentum teres + Transverse Acetabular ligament
- \* HOURGLASS CONSTRICTION OF CAPSULE

Clinical Presentation :-



Δ :-

X Ray  
Broken Shenton Line

USG  
Ioc for screening of DDH

MRI  
Ioc for Δ of DDH

Upper, outer Perkin's Quadrant

American Academy of Pediatrics

overall age > 6 months

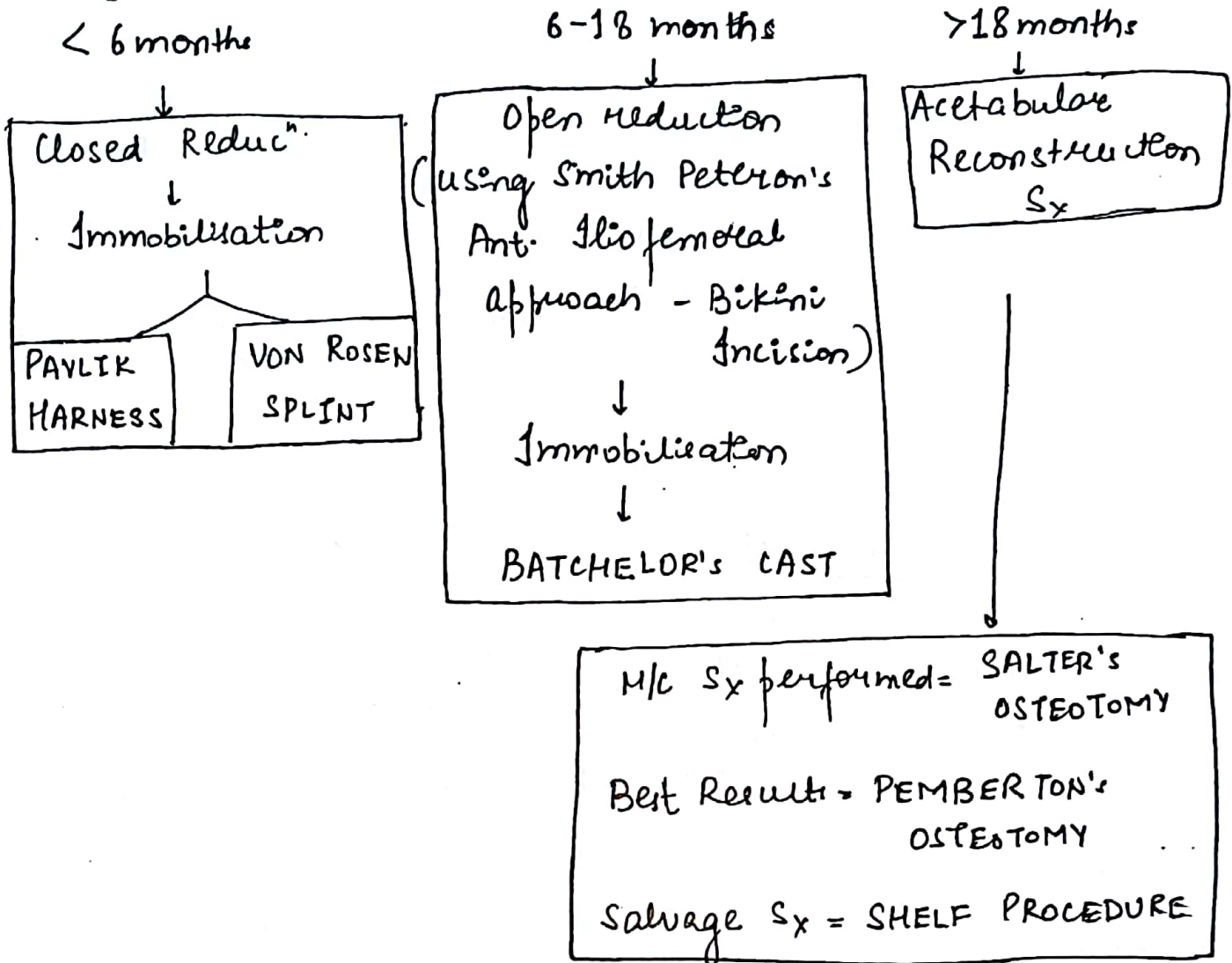
Routine USG screening for DDH at 4-6 wks in ♀ infants

- (+) family history
- Breech delivery

Kashiwaga classification

GRAF's classification

## Age Wise Mx<sup>o</sup>



## (B) SLIPPED CAPITAL FEMORAL EPIPHYSIS

→ Minor

→ Capital femoral epiphysis is well seated inside Acetabulum. It is the anterolateral disruption of Neck.  $\subseteq$  gives apparent posteromedial epiphyseal slip.

## STATISTICS:-

75

Incidence = 1/2000

M/c cause = Idiopathic

M/c RIF = obesity ( $\uparrow$  w/A)

M/c Association = Hypothyroidism

Other ~~M/c~~ Association = Hypogonadism  
GH excess

Craniopharyngioma

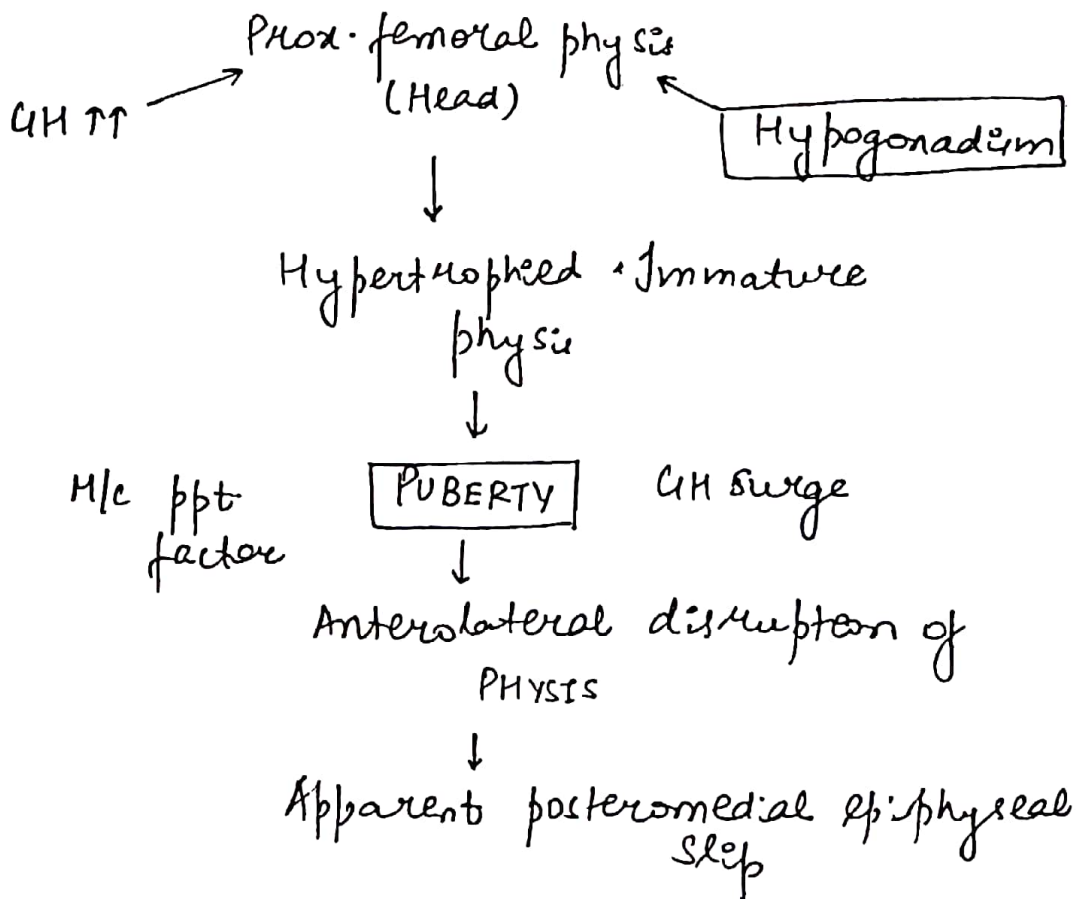
Age Group =  $\sigma$  = 13-17 yrs

$\text{♀}$  = 11-14 yrs

$\sigma : \text{♀} = 2 : 1$

B/L = 30-35%

## PATHOGENESIS:-



**CLINICAL SPECTRUM**:- SHORT / FAT / Sexually immature  
13-17yrs.

c/c - Limping / Antalgic Gait  
OUT-TOEING GAIT

→ Obligatory ER @ Hip during Hip Flexion  
[DRENNAN'S SIGN]

→ child sits in W posture

→ Restricted Abduc<sup>n</sup> + IR

**DIAGNOSIS**:-

X-RAY

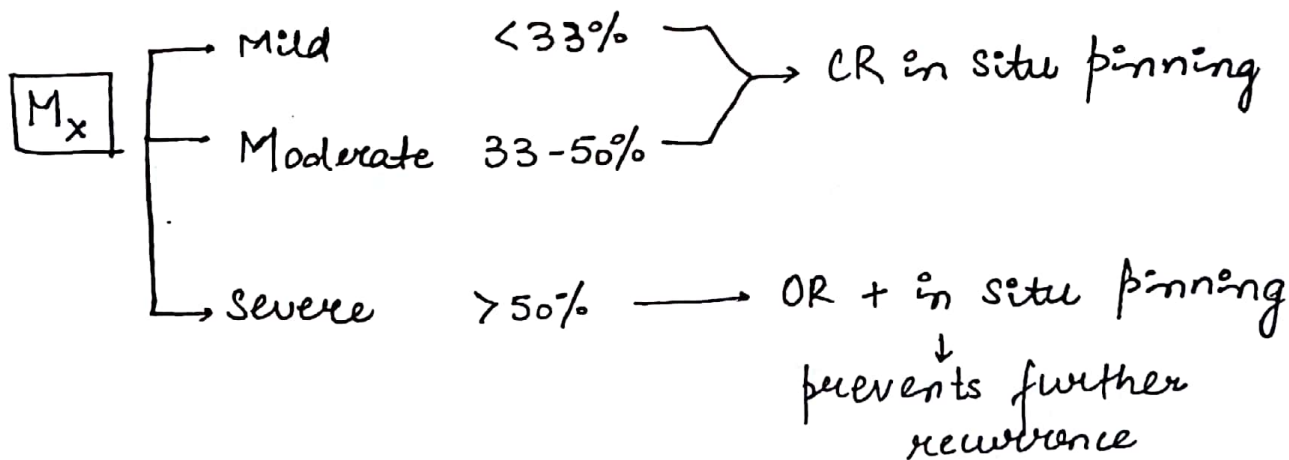
CT

MRI

TRETHOWAN'S  
SIGN

Acute / chronic  
slip

Loc for  $\Delta$



Sx is always done B/L or otherwise length  
discrepancy occurs.



(c)  $\overbrace{\text{PERTHE'S DISEASE / LEGG CALVE}}^{\text{Germany USA France}}$

COXA PLANA / OSTEOCHONDRITIS OF FEMORAL HEAD

**Def<sup>n</sup>** :- Idiopathic spontaneous osteonecrosis of head of femur  
mainly due to blockade of venous outflow

↓  
thick & distended veins  
↓  
arterial compression  
↓  
Ischaemia  
↓  
OSTEONECROSIS

**STATISTICS** =

Incidence = 1/10,000

♂ : ♀ = 5 : 1      ♂ > ♀

Age group = 4-9 yrs

B/L = 10-12%

H/c association = Protein C & S Deficiency  
(factor V Leiden mutation)

Other associations - sickle cell anaemia

Passive smoking

Trauma

Mutation in Type II collagen

## PATHOLOGY

## WALDENSTROM CLASSIFICATION / STAGING

I) Ischaemia

II) Revascularisation + Repair  $\Rightarrow$  fragmentation of Head

III) Reossification

- flat head (Coxa plana)
- Mushroom head (Coxa Magna)
- Small head (Coxa Brevis)

IV) Healed = Residual deficit

## CLINICAL SPECTRUM

→ 4-9 yr old child

→ 1st clinical symptom = Limping / Antalgic gait

→ Pain in Hip

- Groin
- Knee (Referred Pain)
- Thigh

→ Limitation of Abduc<sup>n</sup> + IR @ Hip

→ obligatory ER while hip is flexed

CATTERALL SIGN

## DIAGNOSIS

X-RAY :- 1) GAZE SIGN - (V)/(U) shaped translucency in lateral portion of head

2) SAILING ROPE SIGN - Horizontal Rad<sup>o</sup>-opaque line in upper femoral metaphysis

**JOC** - 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

LATERAL AT RISK SIGNS (X-Ray)

(head at risk)

Graze sign

Metaphyseal cyst

Lateral


calcification


" subluxation of Head

Horizontal lying physis.

CAFFEY'S SIGN:- Loss of sphericity of femoral Head<sup>80</sup>  
̄ subchondral # line mainly in weight bearing anterolateral 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) Maxypage operation - Volkman'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 Sach's lesion
  - 6) Britow - Latarjet operation - ' >>
  - 7) Steindler's Release - Plantar Fascia Release for  
Pes Cavus (High Arched foot)
- 
- 8) Fernandez osteotomy - Malunited # Collar #.

- 9) Varus derotation osteotomy = Perthes'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) Lambornudi Arthrodesis - Fixed equinus deformity at foot
- 15) Girdle Green Procedure (subtalar arthrodesis) (PWI)  
 Congenital vertical Talus.   
 ↳ Rockerbottom foot
- 16) Keller's operation (excision arthroplasty) = Hallux valgus
- 17) Mitchell's chevron osteotomy = Hallux valgus \*\*
- 18) Anterolateral Decompression = TB spine  
 (MC surgery)
- 19) Hong Kong Procedure (Radial Anterior Decompression  
 + Bone grafting)  
 TB cervical spine
- 20) Smith Peterson osteotomy = Ankylosing spondylitis



# INFECTION

82

## (A) OSTEOMYELITIS

Term OM was coined by NELATON.

ETIOLOGY LIST-16

M/c cause of OM

Overall = S. Aureus

Acute OM / chronic OM / developing nation /  
developed nation /  
HIV / AIDS / Diabetic / open # /  
post-sx / Immunocompromised disease } ⇒ S. Aureus

Sickle cell Disease = Salmonella (Dysphrya)

I.v. Drug Abuse = Pseudomonas

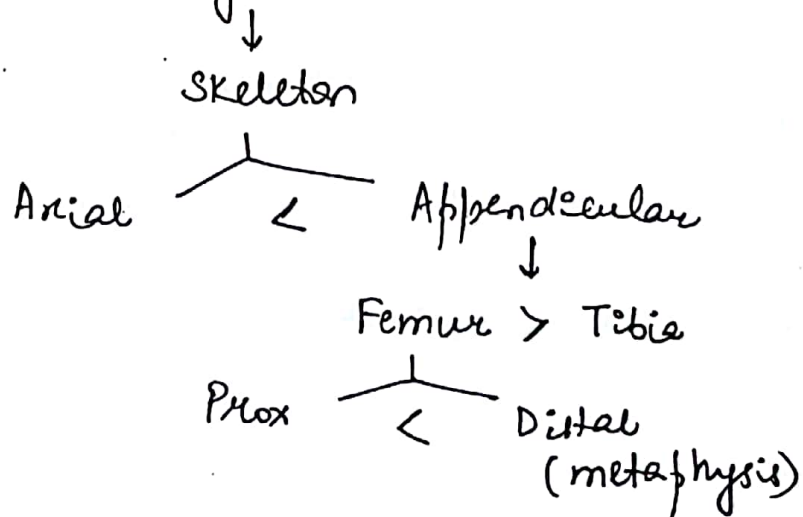
Animal Bite = Pasteurella

Human Bite = Eikenella

Diabetic foot ulcer = Staph aureus

### PATHOGENESIS :-

M/c route = Haematogenous (blood stream)



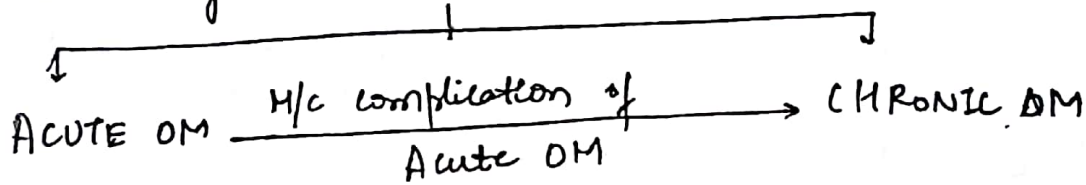
M/c Bone Involved in OM  
 overall → Metaphysis of distal femur  
 Infants/children → " "  
 Adults → vertebral Body

WALDVOGEL CLASSIFICATION

Based on duration of symptoms

Acute OM	Subacute OM	Chronic OM
< 2wks	2-4wks	> 4wks

Immunity \* < Virulence



Path. Hallmark

ABCESS

Staph aureus  
 pus  
 Necrotic bone debris

Path. Hallmark

SEQUESTRUM

- \* dead, Radiodense, Ischaemic, Necrotic, non-viable piece of Bone
- \* separate bone from underlying viable healthy parent bone
- \* surrounded by reactive, immature, subperiosteal, new bone INVOLUCRUM
- \* Two surfaces {
  - Rough
  - Smooth
- \* Never Bleeds
- \* ↓ Microscope = No haversian canal
- \* floats in pus, sinks in H<sub>2</sub>O

## LIST- 17    TYPES OF SEQUESTRUM

Tubular = Pyogenic OM

Ring = Amputation stump, around insertion site of Steinmann's pin

Conical/ Annular = Amputation stump

Ivory = Syphilis

Feathery = TBL (intra cavity) > syphilis

Sand = Finesand    Viral OM

Coarse sand    TB (extra cavity)

\* Rice Grain = TB

Black/ Coke = Actinomyces/ fungal OM

Coralliform = Perthes Disease

Kissing = Paratubercular TB spine

Bombay = H<sub>2</sub>S inhalation.

### Mx of Acute OM :-

young child

Rural background

RUBOR

DOLOR

CALOR

TUMOR

Functio Laesa

x 48-72 hrs

Knee

(I) Blood Counts

CBC/ ESR/ CRP

TLC ↑    N ↑    ESR ↑

CRP ⊕

## II Blood culture

⊕ in 50% of pts

Gram staining      Antibiogram.

>48-72 hr.

S. procalcitonin level  $\Rightarrow$  ~~>0.4 ng/mL~~  $\Rightarrow$   $>0.4$  ng/mL.

↓  
sensitive/specific marker for OM

## III Pain Relief (NSAIDs)

Rest

Immobilisation (splint)

Cold packs

Elevation

Broad spectrum I.V. Antibiotics (empirical therapy)

## IV X-RAYS

1st/earliest X-ray sign = soft tissue shadow/  
Lucency  $\bar{\pi}$  in 48 hours.

2nd X-Ray sign = Periosteal Reac<sup>n</sup>  
(classical) (new bone formation 7-10 days)

## V MRI

IOC for Δ of Acute OM  
 $<24$  hr = marrow edema

VI Indium<sup>111</sup> labelled Leucocyte scan / Gallium-67 scan /  
Technetium<sup>99m</sup> MDP Scan

# Mx of CHRONIC OM

pt  $\left\{ \begin{array}{l} \rightarrow \text{Clinical Hallmark} = \text{SINUS} \\ \rightarrow \text{Pathological } \gg = \text{SEQUESTRUM} \end{array} \right.$

- Rx =
- 1) Sinogram
  - 2) Sinus Tract Exploration
  - 3) sequestrectomy

4) Saucerization

5) Curettage

6) Bone Grafting

Antibiotic laden Bone

Cement Beads.



Punctate bleeding spots  
during curettage  
intra-operatively

↓  
PAPRIKA SIGN

(PNB June, 2012)

good outcome

7) Debridement

8) Sinus Tract Excision

↳ To prevent Recurrence

↳ to prevent Sq cell carcinoma of Tract  
(delayed / more complications)

→ 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**

(+) Pain deep dull aching

(+) (-)

Curettage +  
Bone Grafting +  
Antibiotic cover

**ADULTS**

**CHARRIS SCLEROSING OM**

Long standing chronic OM

Mandible > Tibia

Excess periosteal rxn. by an extremely sensitive periosteum in response to low grade anaerobe

**PUS**

(+) (-) swelling (+)

**Sinus Sequestrum**

(-)

**Mx**

Antibiotics + NSAIDs

**CHILDREN**

# SEPTIC ARTHRITIS

Surgical Emergency

ETIOLOGY:- M/c cause of Septic Arthritis

Overall → Staphylococcus Aureus

Sexually Active Age Group = Gonococcus

PATHOGENESIS:-

S. Aureus

M/c Route - Hematogenous



M/c Joint → KNEE > HIP

S. Aureus



proteolytic enzymes  
(degradative)

collagenase

elastase

Aggrecanase

Uelatinase

Matrix Metalloproteinase (MMP)



destroy Articular cartilage  
in 2-8hrs

Avascular

Aneurial

once degenerated never  
regeneration

Alymphatic  
devoid of peri  
chondrium

↓  
pathological fusion of joint Type II collagen

end result:- BONY ANKYLOSIS



Clinical spectrum:-

Child

Rural background

Rubor	}	Acute onset
Dolor		Severity ↑
Calor		critically ill
Tumor		Septicaemia
Functio Laesa		Chills / Rigor

Earliest / 1st symptom = PAIN

Antalgic / Limping Pain

ROM. can't / shouldn't be checked

Attitude of deformity

Flexion / Abduction / ER

FABER

(most comfortable position of Hip  
Capsular volume & maximum)

MX :-

(I) Blood Counts

(CBC / ESR / ERP

TLC ↑↑    N ↑↑    ESR ↑↑    CRP ⊕

(II) USG Guided Aspiration (NEXT STEP)

for therapeutic purpose  
(not for Acute purpose)

(III) Arthroscopy (Best step)

Surgical irrigation & debridement of joint

- via wide incision + exposure
- thorough lavage
- post-op I/V Antibiotics + drain + skin traction

## MONOCOCCAL SEPTIC ARTHRITIS

M/C - Knee

Not surgical emergency

Responds to Penicillin / Cephalosporin.

## TOM SMITH ARTHRITIS (NEET 2016 - epiphyseal cartilage)

septic arthritis of infancy

M/C - HIP

spreads mainly due to umbilical sepsis

since head is entirely cartilaginous, it

gets completely absorbed.  $\Rightarrow$  poor outcome

**TB**:- M/C 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 I.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 USD.

Expensive raw material

Not cosmetic

NO Barefoot walking

Compulsory shoe wear.

Squatting not possible

SOLID KEEL  $\begin{cases} \nearrow \text{Metal} \\ \searrow \text{Wood} \end{cases}$

Plantar/Dorsiflexion not possible

Inversion/Eversion not possible

Irregular surface walking not possible

### JAIPUR FOOT

Base of LL. Prosthesis

40, - 50 USD

Cheap material (Kaw)

COSMETIC

Barefoot walking possible

Shoe wear optional

Squatting possible

Flexible keel (Rubber)

Plantar/Dorsiflexion possible

Inversion/Eversion possible

Irregular surface walking possible

**SAFE FOOT**  $\rightarrow$  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  $\left\{ \begin{array}{l} \text{Trauma} \\ \text{ Tumour} \end{array} \right.$
- 3) Avoided in  $\left\{ \begin{array}{l} \text{infection} \\ \text{ischaemia} \end{array} \right.$
- 3) **NERVES**  
↳ double ligated  
& gentle traction is applied. a cut in single  
shot to allow prox. cut end to retract a max.  
as possible to avoid Post Amputation NEUROMA
- 4) **A/K Amputation**: Musculotendinous junct<sup>n</sup> of  
Quad. Femoris.
- 5) **B/K Amputation** = Musculotendinous Junct<sup>n</sup> of  
Gastrocnemius

# KNEE JOINT

## LIGAMENTS OF KNEE

### \* MENISCI

Cartilages / shock absorbers

#### 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 L.C.L
- (LM) (Popliteal) (LCL)
- ↓
- Intra-articular tendon.
- More mobile
- can escape twisting injury
- Less injured.

VALGUS injury (more common)

MODE OF INJURY

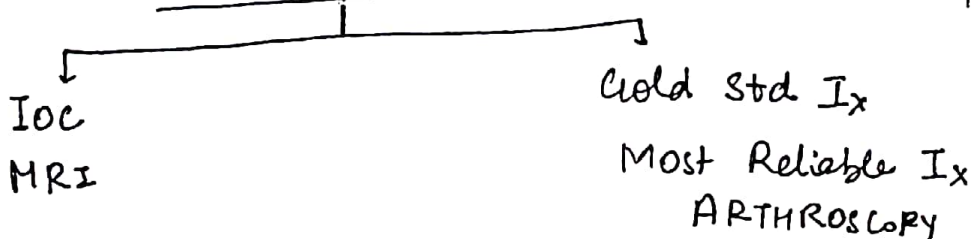
VARUS injury (Less common)

Clinical Tests

- Apley's Grinding Test
- Mc Murray's Test

Mx

#### CLINICAL TESTS



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

supine

- ⓐ Hard - medial jt.
- ⓑ Grab distal end of leg
- Med. collateral lig damage ↓
- excessive valgus can be done
- ↓
- undue opening of medial jt - space
- ↓
- VALGUS STRESS test
- (+ve)

#### Ant. Drawer Test

- Supine → knee flexed 90°
- hold tibia ↓
- finger on post part
- ↓
- extend (anti draw)
- ↓
- Pain excessive

Lachman - 30° flexion + ant. drawer test

#### Pivot shift test

- valgus + IR + flex
- ↓
- tibia pops out

R<sub>x</sub> = Arthroscopic Partial meniscectomy

- \* Menisci move w/ knee movements.
  - They move forward → Knee extension
  - They " backward - " flexion.
- \* Mc ligament to degenerate = Medial Meniscus
- \* Post Partial Meniscectomy
  - LM degenerate & MM remnants
- \* M/c Meniscal Tears:
  - 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

More injured

Twisting Injury

L.C.L

free from L.M.

less fixed

more mobile

escapes

Less injured

VALGUS Injury

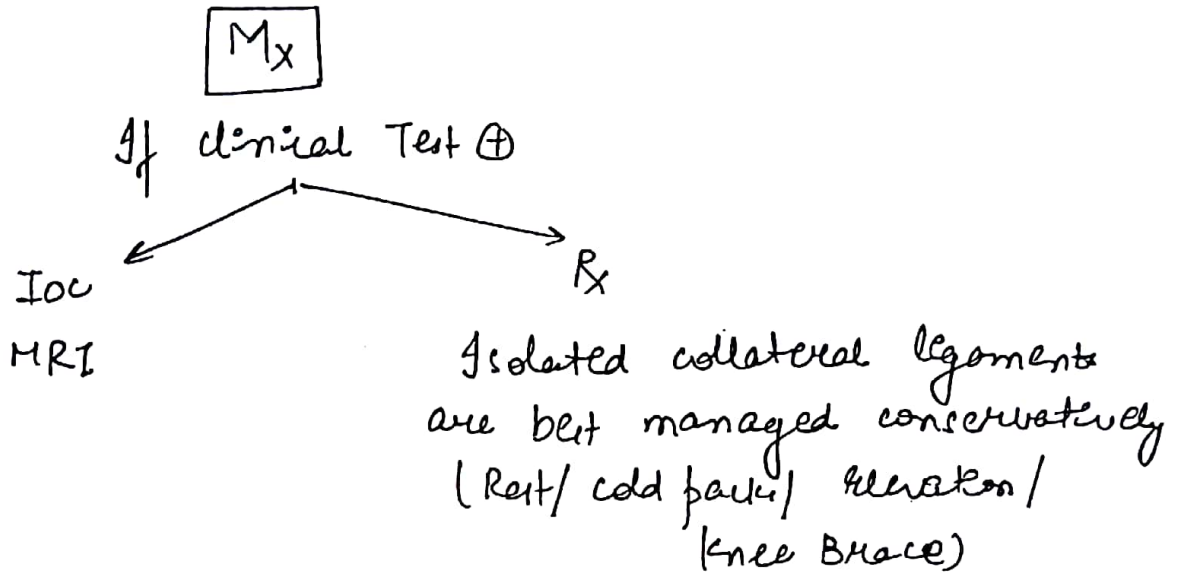
Mech. of Injury

VARUS Injury <sup>95</sup>

VALGUS STRESS test

Clinical Tests

VARUS STRESS Test



M/c Ligament to injured = M.C.L.

CRUCIATES

Sagittal plane stability

A.C.L.

Intracapsular

Intraarticular

Entrap~~ment~~  
synovial

P.C.L.

Intracapsular

Intraarticular

Entrap~~ment~~  
synovial

1.5 times broader

better visualised on MRI

ACL prevents excess anti-translation of tibia over femur

PCL prevents excess post-sagging of tibia over femur

Downhill/ Downstair

Mid substance

M/c site of  
tear

Uphill/upstair

Femoral attachment

Hyperextension  
injury

> MOI >

Hyperflexion injury

### Clinical Tests

ANT. DRAWER'S TEST (Knee 90°  
flexion)

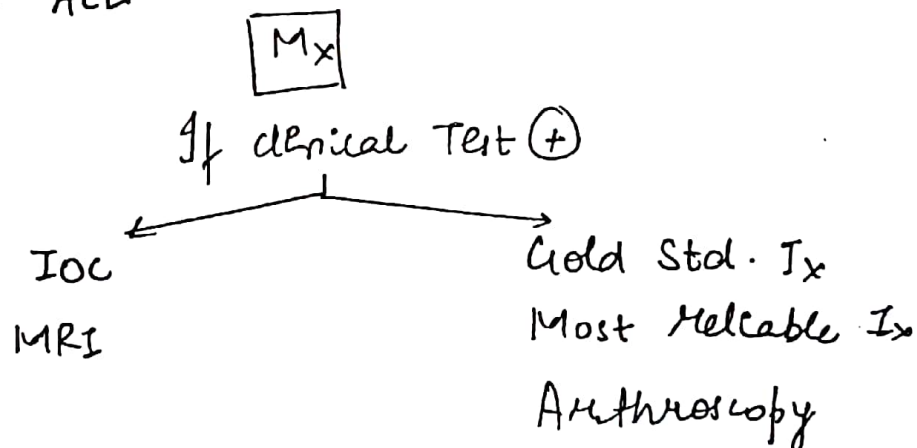
POST. DRAWER'S TEST

LACHMANN'S TEST

Best for ACL acute. (Knee 30°  
flexion)

PIVOT SHIFT TEST

Most specific Test/ Gold std.  
test for ACL



Rx = ARTHROSCOPIC ACL/PCL RECONSTRUCTION

(M/c Donor tendon = Semitendinosus + Gracilis  
Graft)



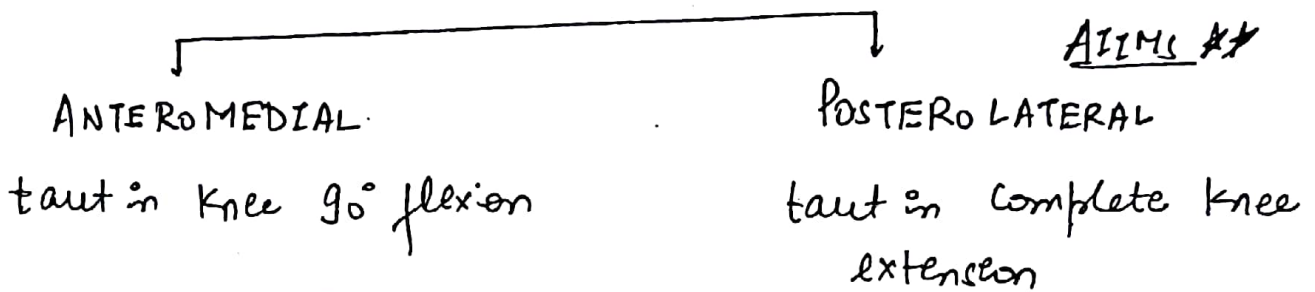
ACL ← middle geniculate artery (Br. of popliteal A)

PCL ← post. articular artery (BR. of Tibial N).

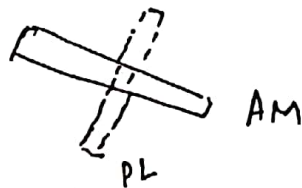
M/c common surgically operated leg = ACL  
(knee)

M/c cause of Haemarthrosis = ACL

ACL



knee 90° flexion.



knee complete extension



Most pain sensitive structure in joint = capsule

Least " " " " " " = Articular cartilage

Meniscal cyst :-

appear as swelling along post. joint line

& disappear in jt on knee flexion.

(PISANI SIGN)

Meniscal Tear MM > LM.

Meniscal Cyst / Discoid Meniscus 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

sitting posture  
Popliteus

\* Portals In Arthroscopy =

Suprolateral = patellofemoral Jt ~~view~~ visualization

Anterolateral = VISION

Anteromedial = Instrumentation.

ACL / PCL Tear = ♀ athlete > ♂ athlete



Narrow intercondylar notch

Hormonal influence

leg. laxity ↑

Knee leg injury = MRI

[Gold Std Ix  
Asopy]

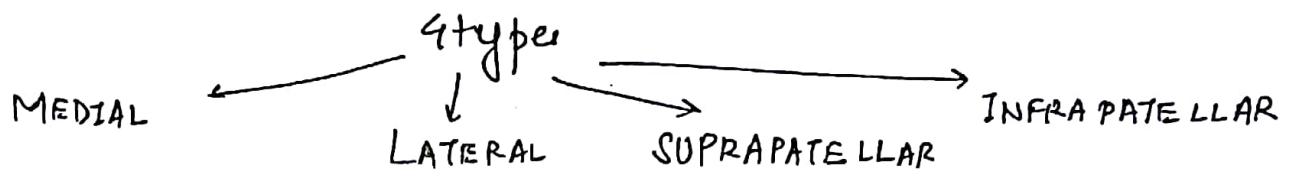
I0c

Knee Cartilage injury = arthroscopy

Multiligament knee injury  
 Injury to at least 2 out of 4 (except meniscus)

### PLICA SYNDROME

Embryonal remnants of synovium



C/F -> Ant. Knee Pain

= exaggerates on prolonged sitting

-> Locking/catching symptoms

Association - Chondromalacia patellae

Comp<sup>n</sup> - Meniscal Tear.

IOC - MRI

Gold std. Ix = A<sup>r</sup> scopy

Rx = A<sup>r</sup> scopic plica resection

# ONCOLOGY

LIST-19

MOST COMMON

M/c BONE TUMOUR = Metastasis/2°

M/c Malignant B.T. = Metastasis/2°

M/c 1° malignant B.T. = Multiple Myeloma > osteosarcoma

M/c Benign B.T. - osteochondroma/exostosis

M/c True Benign B.T. = Osteoid osteoma

M/c 1° malignant B.T. =

↳ of 1st decade of life = Ewing's Sarcoma  
↳ of chest wall = chondrosarcoma

M/c Radiation induced BT = osteosarcoma

Most Radioresistant BT = "

M/c <sup>Bone</sup> Benign Tumour of Hand Bone = Enchondroma

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

M/c 1° malignant BT. of Hand Bone = chondrosarcoma

M/c malignant Tumour of Hand = SCC

## LIST-20

## CHONDROBLASTOMA / CODMAN'S TUMOR

- Benign Tx cases - (Dost ka nephew)
- Age < 18 yrs.  
↳ skeletally immature pts

[

 centric  
 epiphyseal  
 expansile
 
]

 slightly  
 symmetrically

- Long standing pain & swelling. (↑ on exertion)
- Mimics Synovitis.
- X-Ray :- well circumscribed  
 Regular margins  
 Epiphyseal lesion.  
 Stippled calcification.

BIOPSY :- chicken wire calcification.

Mx :- Extended Curettage + Bone Graft / Bone cement

## GIANT CELL TUMOUR / OSTEOCLASTOMA

Locally aggressive

5-15% GCTs are malignant

♀ > ♂

H/c Bone = Distal femur epiphysis

G.C.T. → spine (vertebral body)



GE :- Eccentric  
 Epiphyseal  
 Expansile  $\left\{ \begin{array}{l} \text{cross} \\ \text{asymmetrical} \end{array} \right.$   
 Egg shell crackling

Age Group :- 20-40 yrs (skeletal mature pt.)

**X-RAY** - Geographical destruction  
 Soap Bubble appearance

**Mx** wide excision  $\bar{c}$  customised prosthesis  
 allograft Reconstruct<sup>n</sup>.

Microscopy = GCT  $\Rightarrow$  Giant cell (40-60 nuclei)

### GIANT CELL VARIANTS ★★ ★★ ★★

- (A) aneurysmal Bone Cyst (closet)
- (B) Brown's Tumour
- (C) chondroblastoma
- (D) desmoid-like fibroma
- (E) Pulis / Giant Cell Rich GManuloma
- (F) fibroma of non-ossifying type (M/c variant)
- (G) Giant cell Rich osteosarcoma
- (H) histiocytoma

## ANEURYSMAL BONE CYST

Locally aggressive B.T.

♀ > ♂

M/C site - Metaphysis of Prox. Femur

ABC → spine (post. column)

Age Group - 10-18 yrs

Expansile < grossly (more pulsatile)  
Asymmetrical      Bruit ⊕ on auscultation.

Eccentric

X-RAY multiple blood filled sinuoids  
= well defined septate in between

Closest Giant cell variant

Rx wide excision + Allograft Reconstruction.

## OSTEOSARCOMA

Highly highly malignant B.T.

M/C 1<sup>o</sup> malignant B.T. of non hematopoietic origin.

M/C Radiation induced B.T.

Most Radioreistant Bone Tumour

TYPES	1 <sup>o</sup>	2 <sup>o</sup>
	75%	25%
	2 <sup>nd</sup> Decade	5 <sup>th</sup> /6 <sup>th</sup> decade
	de novo	pre. malignant lesion

M/c - Paget's Ds of Bone (<1%)

Post radiation

chr. 0M

p53 mutation

Hereditarily survivors of  
Retinoblastoma

M/c Bone: Distal femur (metaphysis)

M/c site of 2° from osteosarcoma → Lung  
(via blood stream)

Bone to Bone metastasis

X-RAY

2P's

→ Periosteal Rxn (Sunray / Sun Burst  
along Sharpey's fibres Appearance)

→ Periosteal elevation (Codman's Δ)

Mx = Neoadjuvant Rx

Pre-op chemo

→ Radical  
excision  
(~10cm)

→ Megaprosthesis  
(arthroplasty)

↓ size, vascularity,  
metastatic  
pot<sup>n</sup>

↓  
Post-op chemotherapy

T10 Protocol

High Dose Methotrexate

(Rosenberg  
Protocol)

(cisplatin → substitute)

Bleomycin

Cyclophosphamide / Ifosfamide

Doxorubicin

Actinomycin

Vinorelbine

**ENCHONDROMA**

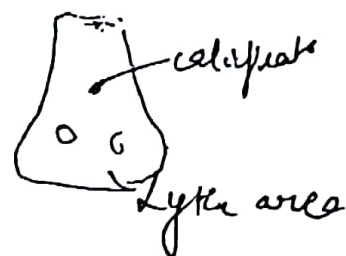
M/c Benign Bone Tx of Hand Bones

M/c Bone Tx of Hand Bones.

Age Group - (4<sup>th</sup> - 6<sup>th</sup> Decade) $\sigma > \text{♀}$ 

M/c site = Hand &gt; Foot

↓

 Phalanges > Metacarpal


**X-RAY** well defined lytic lesion = wisps of calcification  
(stepped calcification)

usually solitary

Rarely Multiple

OLLIER

multiple enchondromatosis

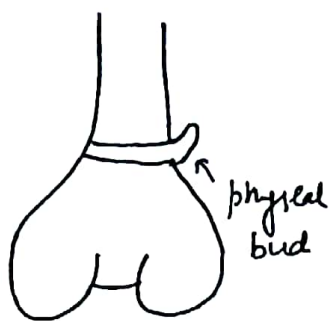
MAFFUCCI

multiple enchondromatosis

+ Phlebotoma +

Cavernous Hemangiomas.

# OSTEO CHONDROMA/ EXOSTOSIS



M/c Benign B.T.

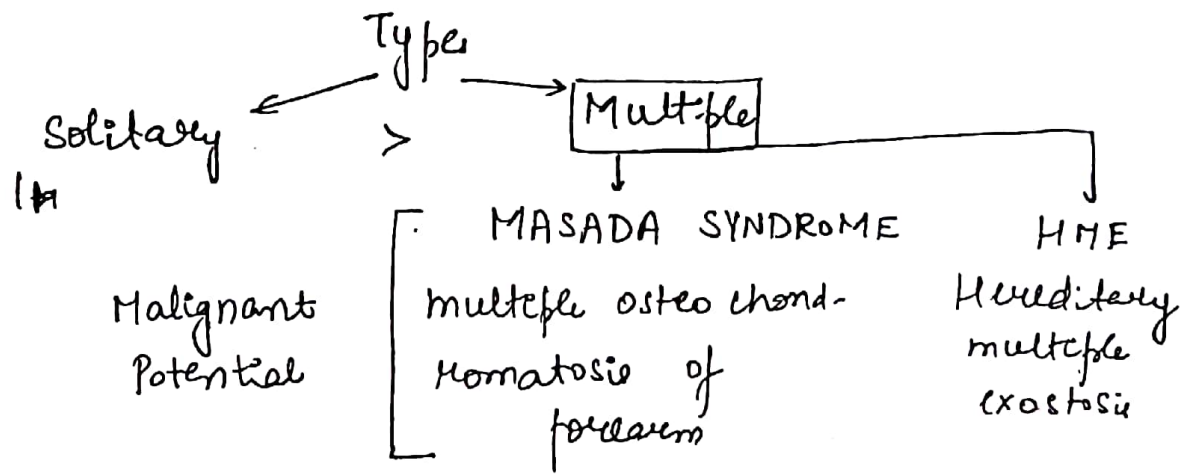
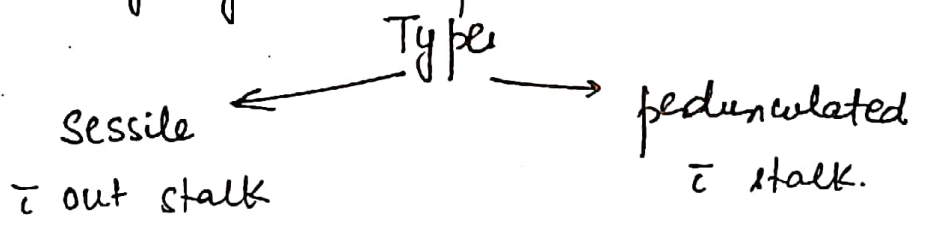
Not true B.T.

♂ > ♀

M/c site = Metaphysis (Distal Femur)

Age Group = 4-12 yrs

Usually regresses before skeletal maturity

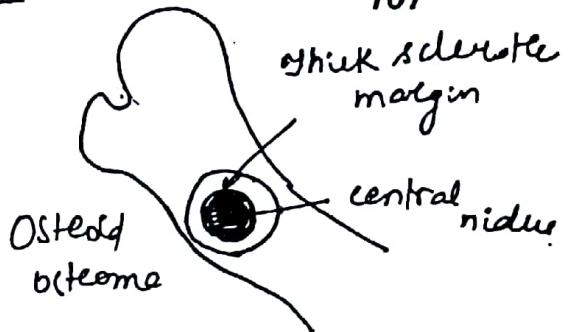


Mx = Surgical excision in toto if symptomatic.



# OSTEIOD    OSTEOMA

107



## OSTEIOD OSTEOMA

M/c True Benign B.T.

2<sup>nd</sup>/3<sup>rd</sup> decade

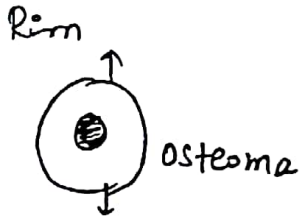
♂ > ♀

FEMUR

M/c Bone

O.O. → spine (post. column)

Peripheral thick. Reactive Sclerotic



Central Radiolucent  
Pb ↑↑↑↑ Rich nidus

OSTEIOD

d/a < 2cm

↑↑↑↑

90%

Low Dose Aspirin  
Radiofrequency Ablation  
Curettage of nidus

Structure

Night Pain

Aspirin Relief

Mx

## OSTEOBLASTOMA

Rare B.T. (aggressive than O.O.)

2<sup>nd</sup>/3<sup>rd</sup> decade

♂ > ♀

SPINE (Post. column)

Radiolucent  
Peripheral Rim



central sclerotic P4↑↑  
Rich nidus.

d/a > 2cm.

↑↑

40-50%

Marginal excision  
Bone grafting / Bone cement

# EWING'S SARCOMA

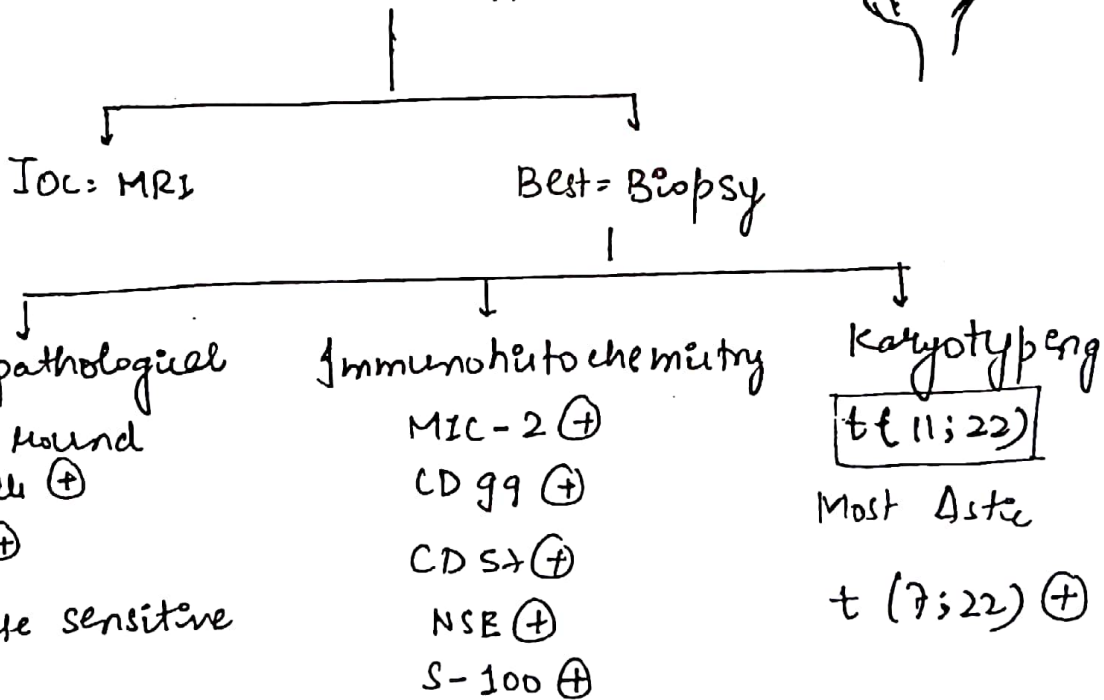
5-15 yr ♂

Pain Swelling }  $\textcircled{B}$  High M/c site = Femur (dia)

CBC	TLC $\uparrow\uparrow$	}	Mimics = Osteomyelitis
ESR	NT		
CRP	ESR $\uparrow$		
	CRP $\oplus$		

NSAIDs/ Antibiotics  $\rightarrow$  Temporary Relief

X-Ray - Laminated/ Lamellated Periosteal Reaction (onion peel appearance)



Bone to Bone Metastasis - Ewing's Sarcoma > Osteosarcoma

Most Chemo/Radiosensitive

**Mx** :- E.C.R.T. (Extra Coaporeal Radiotherapy) +  
Internal fixation

LIST-20 ONE LINERS (METASTASIS)

1) Bony 2°

- ♂ → Ca prostate > lung
- ♀ → 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

IOC for Occult

- Blastic 2° = Bone Scan
- Lytic 2° = Pet-CT

Pulsatile 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, T<sub>12</sub>

- ↳ due to O. porosis → "
- ↳ due to Bone 2° → Neck of femur

## MIREL'S SCORE

Calculates Risk of Impending Pathological #  
in Bony 2°

Parameters	①	②	③
Size of Lesion	$< 1/3$ rd	$1/3 - 2/3$	$> 2/3$
Site of Lesion	UL	LL	around hip
Nature of Lesion	Blastic	Mixed	Lytic
Pain due to Lesion	Mild	Mod.	Severe

Total  $\geq 8 \Rightarrow$  High Risk of path #

$M_x =$  prophylactic int. fixation.

# TB

## POTT'S SPINE

ETIOLOGY - Mycobacterium TB

[pulmonary TB =  $10^7 - 10^9$  bacillary load]

skeletal TB =  $10^5$  bacillary load  
(Paucibacillary)

### PATHOGENESIS

M/c Route = Haematogenous

Sites:- Lung > Lymphnode > G.I.T > Skeleton  
4<sup>th</sup> M/c site of TB.

Mycsete

U.T.S.  
↓  
L.T.S.  
↓  
T.L.J<sup>^</sup>

### M/C SITE

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

L/C SITE OF  
Skeletal TB

Bursal TB  
(Amongst Bursa)

↓  
M/c Bursitis

[Trochanteric Bursa]

L/C site of TB in Bone/Joint

Mandible < T.M.J.



## TYPES OF LESION :-

### I) PARADISCAL TB \*\*

M/c Type

Anterior spread

1st part:- V. Body Adjacent to IV. Disc

Kissing sequestrum.

M/c type / Lesion to complicate into POTT'S PARAPLEGIA.

### II) CENTRAL

Venous spread (interosseous venous plexus)

1st part = centre of V. Body

IV. Disc is usually preserved

Later stages:- whole body collapses 'CONCERTINA COLLAPSE'

↓  
~~1st~~ Flat V. Body (vertebra plana)

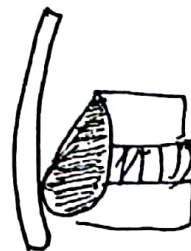
### III) ANTERIOR TB

spread ~~superficially~~ subperiosteally beneath A.L.L

Children

Wet/ exudative TB

ANEURYSMAL phenomenon  
(X-Ray)



#### IV) POSTERIOR / APPENDICEAL TB.

LC type

LC site = Facet Joint

2<sup>nd</sup> LC site = Spinous Process

#### CLINICAL SPECTRUM :-

1<sup>st</sup>/earliest symptom = Backpain

1<sup>st</sup>/earliest sign = Paraspinous M/s spasm

↓ R.O.M. @ spine

Cautious Gait

Military Attitude

Constitutional Features of TB (60% of cases)

COLD ABSCESS (tumour +)

No. Huxley/deloid color

↳ Travel along NV Bundle + muscle sheath

Deformity :- prominent spinous process due to  
Kyphotic deformity

↳ Knuckle - 1 v. Body

↳ Angular Kyphosis → 2/3 v. Bodies (Hibber)

↳ Rounded Kyphosis > 3 v. Bodies

## DIAGNOSIS :-

⇒ X-RAY :-

1st X-Ray Sign → ↓ I.V. Disc Space  
 ↓  
 V. Body, destruction/erosions  
 ↓  
 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 dactylitis/spina  
 ventosa

⇒ MRI :- IOC for Pott's spine

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

Mx :-

\* Chemotherapy (main stay) → A.T.T

\* Bed Rest

\* TAYLOR'S SPINAL  
BRACESx

- 1) Deafferent
- 2) Relapsing
- 3) Resistance
- 4) Compression over vital str
- 5) Late presentation  
(advanced paraplegia)

Sx

1) HONG KONG OPERATION Ant. decompression FB  
cervical spine

2) ANTEROLATERAL DECOMPRESSION  $\bar{c}$  BONE GRAFTING

→ M/C Sx performed

→ DOTT & ALEXANDER 1947

→ DR. S.M. TULI  $\Rightarrow$  (R) Lateral position  
Semicircular incision

STH. to be Removed :-

- 1) Transverse process
- 2) part of pedicle
- 3) v. Body (diseased)
- 4) post. part of rib
- 5) I.v. Disc (diseased)

POTT'S PARAPLEGIA

M/C site = U.T.S.

I	II	III	IV
Pt unaware of neuro deficit	Pt. aware of neuro deficit $\bar{c}$ support ambulatory	Paraplegia in extension	Paraplegia in flexion
o/Ez Ankle Clonus	(N) sensory	Sensory Loss < 50%	Sensory loss $\geq$ 50%
Spasticity	Motor Loss	Sensory Loss	Sphincter Loss

## PROGNOSTIC MARKERS & FACTORS :-

	GOOD	BAD
Age	young	older
ONSET	early	Late
DURATION	shorter	Longer
PROGRESSION	slow	Rapid
LESION TYPE	wet / exudative	Dry
SEVERITY	stage I/II	III/IV
GEN. CONDITION	good	Poor
KYPHOTIC DEFORMITY	$< 60^\circ$	$> 60^\circ$
CORD STATUS IN MRI	(N)	Myelomalacic change

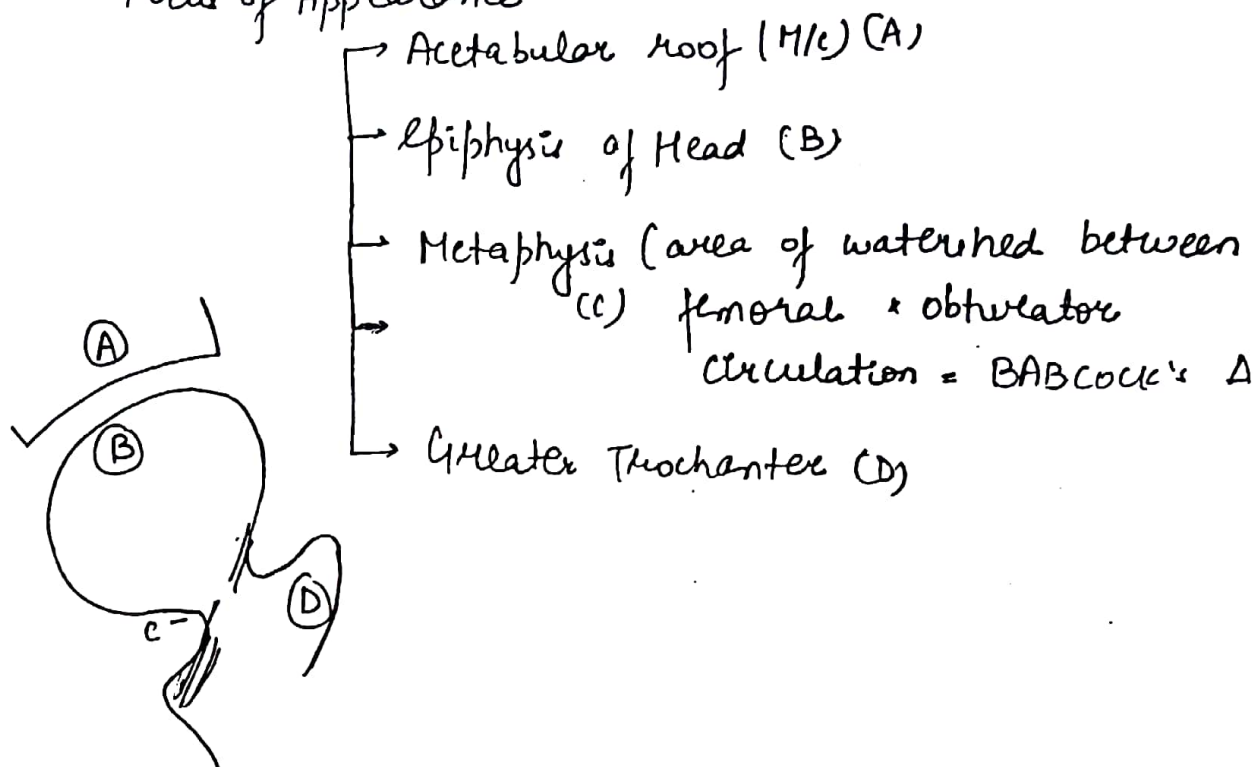
M/C cause of kyphosis in India = TB



## TB HIP

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

Focus of Appearance



### STAGING OF TB HIP

#### ① SYNOVITIS :-

Flexion + Abduction + ER (FABER)

Joint effusion + capsular distension

X-RAY :- Widened Joint space

#### ② EARLY ARTHRITIS :-

Flexion + Adduction + IR (FAAIR)

detachment of Acetabular Cartilage

Thru shortening < 1cm

X-RAY :- Narrowing of Jt. space

### III ADVANCED ARTHRITIS / LATE

Flexion + Adduction + IR

further destruction of joint

True shortening  $> 1\text{cm}$

X-RAY - Complete Destruction of jt space / Head / Acetabulum

### IV LATE ARTHRITIS = SUBLAXATION / DISLOCATION

Flexion + ~~Adduction~~ Adduction + IR

Gross shortening

upward, Lateral subluxation / dislocation of Head

False Acetabulum Higher up

(Wandering acetabulum / Travelling acetabulum)

MORTAR & PASTLE Appearance

### CLINICAL PICTURE:-

5-15 yrs

M/c earliest symptom = Painful Limp

Limping / Antalgic Gait

Muscle wasting

Shortening

Deformities

Constitutional features

Cold Abscess

Late Stage = Fibrous Ankylosis

X-RAY:- PHEMISTER 's TRIAD

Juxta articular osteopenia (1st X-Ray sign)  
 periauticular erosions  
 ↓ Jt. space

Mx = ACTIVE STAGE → A.T.T.  
 → SKIN TRACTION. → relieves spasm

If pt. doesn't respond to above

WILKINSON'S JOINT CLEARANCE Sx  
 (Debridement)

HEALED STAGE

subtrochanteric osteotomy

Girdlestone excisional arthroplasty

Arthrodesis (surgical fusion of a joint) ⇒ M/cly performed  
 ↳ painless fused stable joint

Arthroplasty → painless mobile stable joint  
 (THR)

## OSTEOARTHRITIS

misnomer

Degenerative Joint Disorder [D.J.D.]

Non Inflammatory

~~wear~~ wear & tear joint disorder

R/F:-  $\sigma > \rho$

Age > 65 yrs

BMI > 30

Sedentary Life style

Occupational Hazards

Previous Trauma

Joints:-

Knee

Hip

Spine

1st C.M.C. Jt.

2nd M.T.P. Jt

PIP jt

DIP jt

OA Knee

M/c Bone = Patella

M/c Compartment = Medial

M/c muscle = VMO

Vastus medialis

obliquus.

M.C.P.Jt  
Wrist → Rheumatoid  
arthritis

# PATHOGENESIS

1st Layer = Articular Cartilage

## OUTERBRIDGE STAGING

- (I) - Articular Cartilage water content ↑  
softening of articular cartilage
- (II) fissures / cracks / fragmentation
- (III) partial detachment
- (IV) complete ~~detachment~~ detachment  
→ exposed subchondral Bone



## CLINICAL

60+ ♀

1st earliest symptom - Pain

Tenderness

Swelling

Crepitus

Deformity

→ Knee = Genu Varum

→ Bouchard's, PIP Jt nodes

→ Heberden's, DIP Jt nodes

↓ walking distance

## X-RAY :-

1st earliest X Ray sign = Asymmetric Reduction in jt space

↓  
osteophytes

↓  
Loose Bodies.

↓



↓  
Subchondral Sclerosis  
↓  
Absolute destruct<sup>n</sup> of  
jt. space

**Mx** :-

### CONSERVATIVE

- 1) Walking crutch/stick  
↳ opposite hand
- 2) Hinged knee Braces  
↳ offloading devices.
- 3) NSAIDS  
Safe → Acetaminophen.
- 4) COX-2 Inhibitors  
→ Etoricoxib (60/90/120/mg)  
→ No GI S/E
- 5) Topical Liniments
- 6) Isometric Quadriceps strengthening exercise
- 7) Precautions
- 8) Intra-articular viscosupplementation  
↳ Hyaluronic Acid derivatives  
↳ viscosity of synovial fluid

### SURGICAL

#### 1) **ARTHROSCOPY**

Initial phase of disease

- \* Remove inflamed tissue
- \* Remove loose Body
- \* Arthrolysis

#### 2) TOTAL KNEE REPLACEMENT

Absolute Indication

↳ Pain.

- \*\*\* Glucosamine
  - Diaceren.
  - Chondroitin sulfate
  - S-adenosyl methionine
  - (PLACEBO A EFFECT)
- } ⇒ OA

## ADVANCED TRAUMA LIFE SUPPORT.

### POLYTRAUMA

Injury to ≥ 2 systems

### TRIAGE

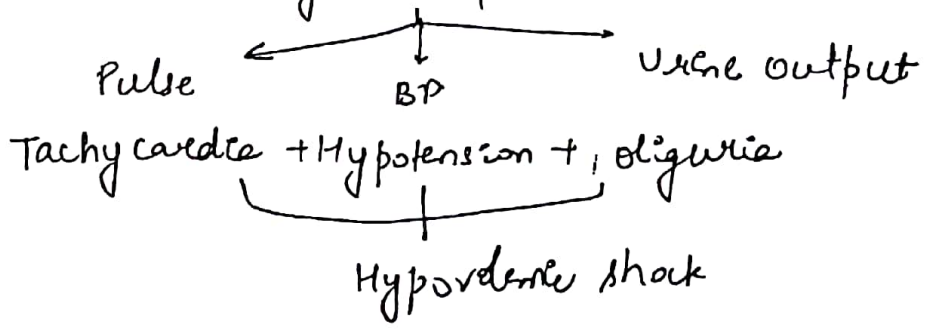
#### SEQUENCE OF 1° SURVEY (ATLS)

- \* Cervical spine control
  - Hard cervical collar
  - Philadelphia collar
  - log roll position

- \* Airway → suction
  - Endotracheal Intubation

- \* Breathing - Rule out :-
  - Tension Pneumothorax
  - Hemothorax
  - Flail chest

- \* Circulation - Hemodynamic parameters



Stop Bleeding > IV fluids / BT.

\* massive Catastrophic H<sup>2</sup>g  
 ↳ circulation is a priority even before

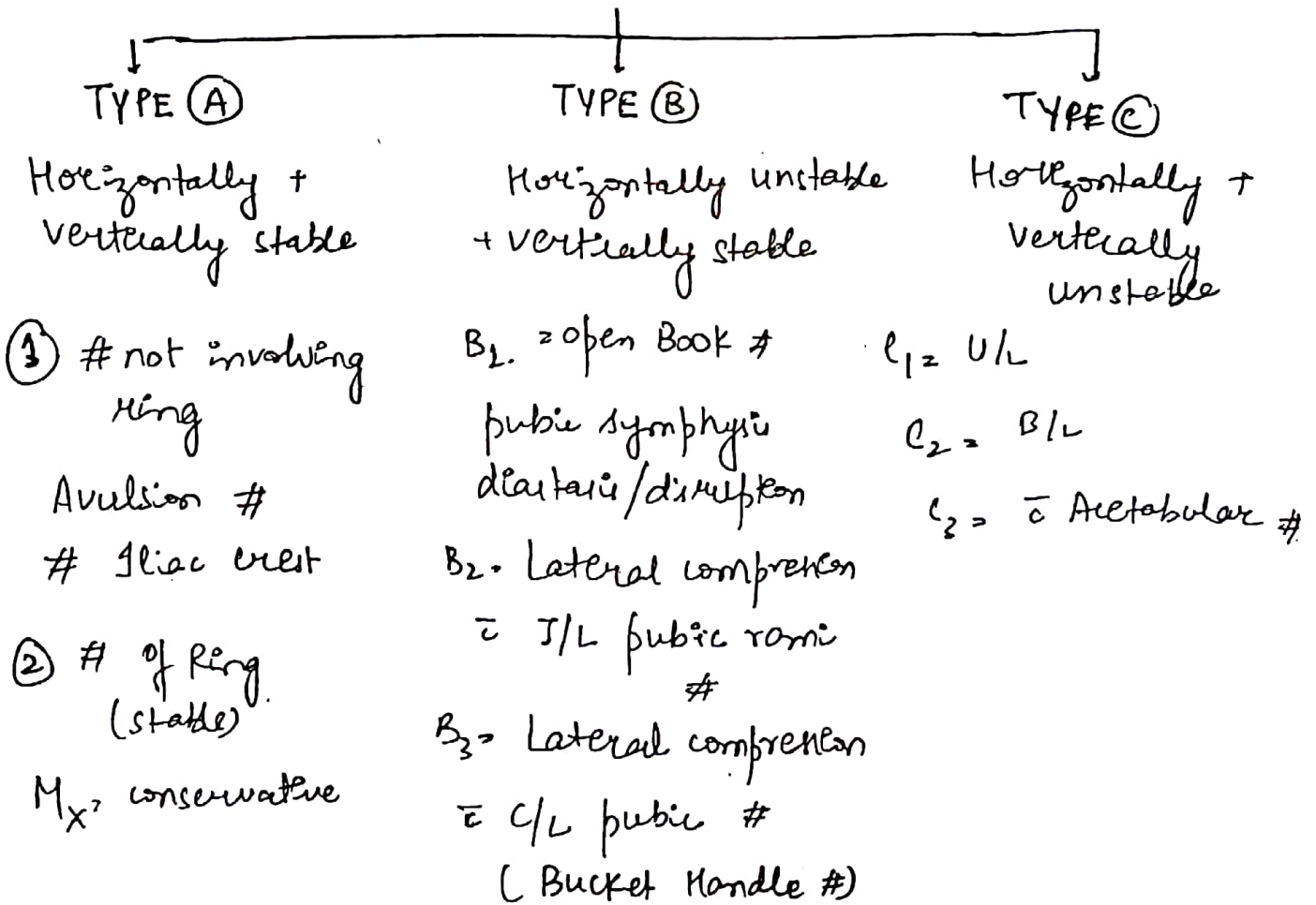
\* Disability  
 GCS  $\left\{ \begin{array}{l} \text{eye} \\ \text{verbal} \\ \text{Motor} \end{array} \right.$

\* Exposure  
 to rule out occult injuries

**TRAUMA AROUND HIP.**

**(A) # PELVIS**

**TILE'S CLASSIFICATION**



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 fixator.

(to ↓ pelvic volume create pelvic tamponade

effect create pelvic hemostasis.)

### MOREL - LAVALLEE LESION

- Post-traumatic closed degloving soft tissue injury in skin + subcutaneous tissue
  - Vessels + Lymphatics perforate + fill the potential space w/ blood, serosanguinous fluid + necrotic fat
  - Pt presents w/ enlarging painful mass in anterolateral thigh + close to greater Trochanter
- Rx = Aspiration, + Tube Drainage

## (B) HIP DISLOCATION

<p>Post. H.D.</p> <p style="text-align: center;">90%</p> <p>P.H.D</p> <p>Mech. of Injury</p> <p>Flexion Adduc<sup>n</sup> IR</p> <p>Acetabular Attitude</p> <p>FAd.IR</p> <p>MC Compli cation</p> <p>AVN of Head of femur</p> <p>M/C N/V Injury</p> <p>Sciatic N/V</p>	<p>ANT. H.D.</p> <p style="text-align: center;">7-8%</p> <p>AHD</p> <p>Flexion Abduc<sup>n</sup> ER</p> <p>FAbIR</p> <p>Femoral N/V</p>	<p>CENTRAL # DISLOCATION OF</p> <p style="text-align: center;">HIP 1-2%</p> <p>LHD</p> <p>Flexion / Flexion Abd. / Adduc<sup>n</sup> ER / IR</p>
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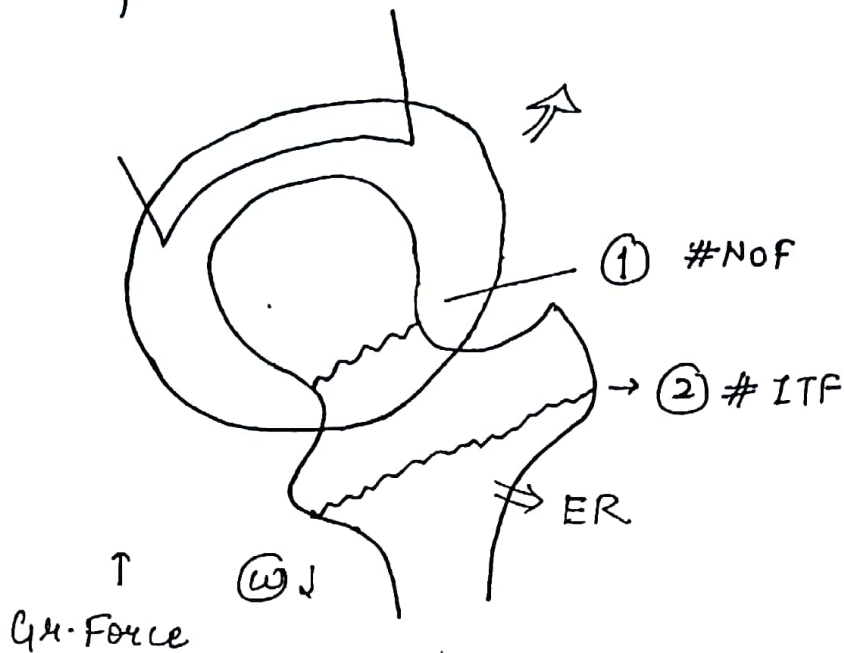
M<sub>x</sub> Closed Reduction ↓ Gen. Anaesthesia

Methods of CR →

- 1) Stimson's Gravity Method
- 2) East Baltimore left
- 3) Modified Allis method  
(of choice)



# ① # of PROXIMAL FEMUR

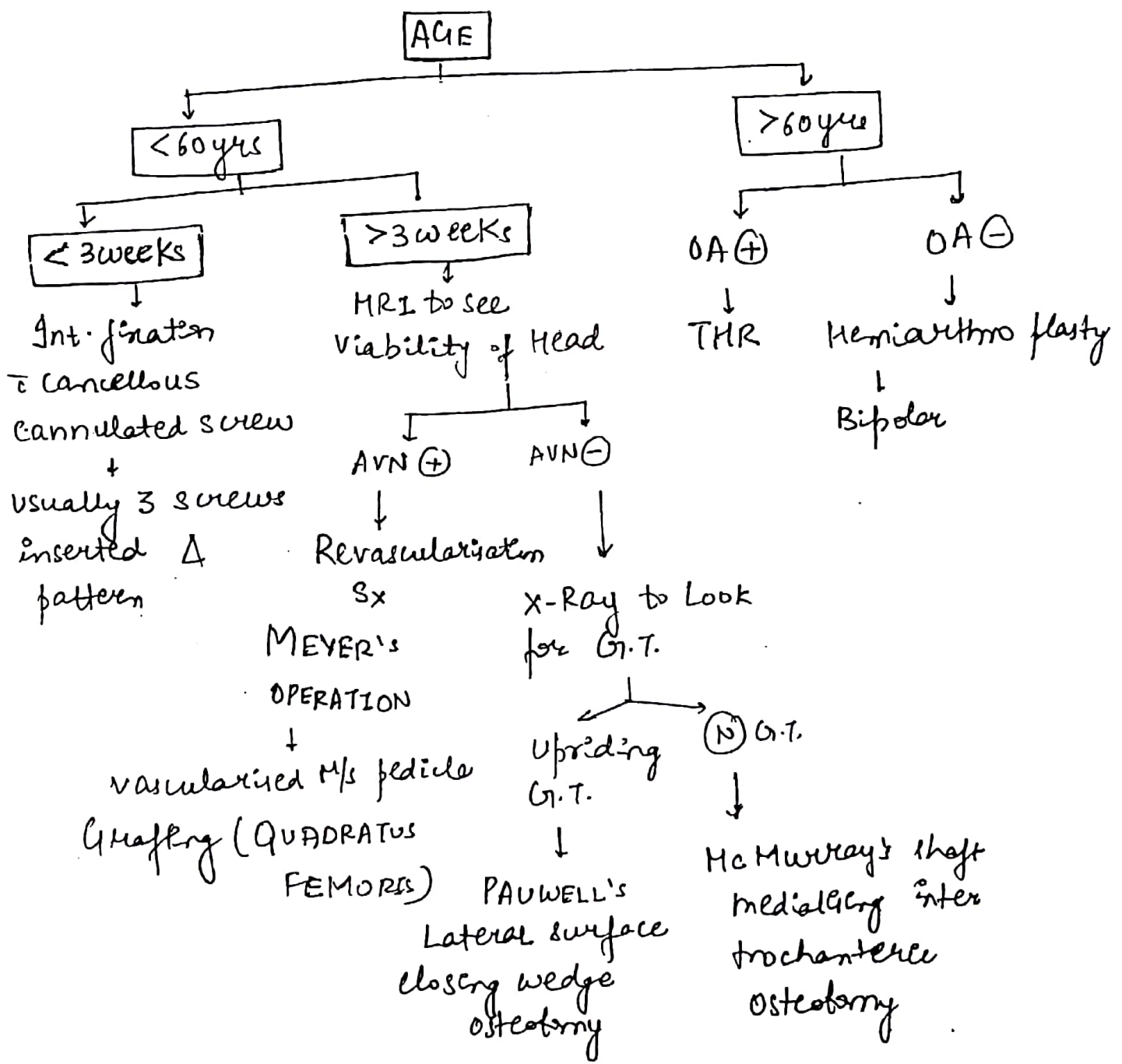


NOF		ITF
Intracapsular		Extracapsular
5 <sup>th</sup> /6 <sup>th</sup> decade		7 <sup>th</sup> /8 <sup>th</sup> decade
Trivial Trauma (low energy fall)		Mod-severe Trauma
Mod-severe		severe pain, Swelling, ecchymosis around G.T.
Pain in Scarpa's Δ		
< 1 inch	Shortening	> 1 inch
0-45°	E.R. Deformity	45-90°
AVN of Head	M/c Complication	Malunion
Non-union.		
ANATOMICAL	Classification	EVAN'S
PAUWEL'S		BOYD + GRIFFITHS
GARDEN'S		

Mx Internal fixation =  
DHS / DCS / PFN

- Dynamic Hip screw
- Dynamic condylar screw
- Proximal femoral nail.

AD PROTOCOL FOR Mx of # NOF (Speed ↓  
Unsolved #)



# # Shaft of Femur

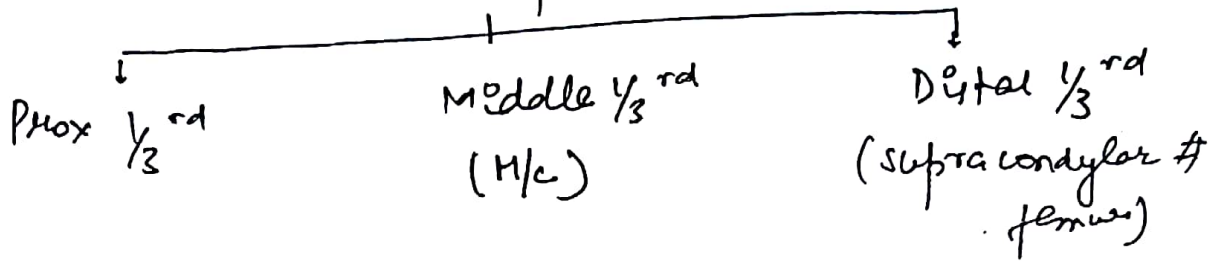
Young adults

20-30 yrs

♂ > ♀

associated = severe Trauma

## Classification



## COMPLICATIONS:-

- 1) Hypovolemic shock  
Avg Blood Loss = 1.1.5 L or 2-4 units.
- 2) fat embolism syndrome
- 3) Infection
- 4) knee stiffness
- 5) malunion
- 6) delayed / Non-union.

**Mx**

**Age wise**

< 6 months

6 months - 5 yrs

5-10 yrs

> 10 yrs

PAULIK

HEPSPICA CAST

TEN

Intramedullary

HARNESS

GALLOW'S /

Titanium

Interlocking

BRYANT'S TRACTION

elastice

Nailing

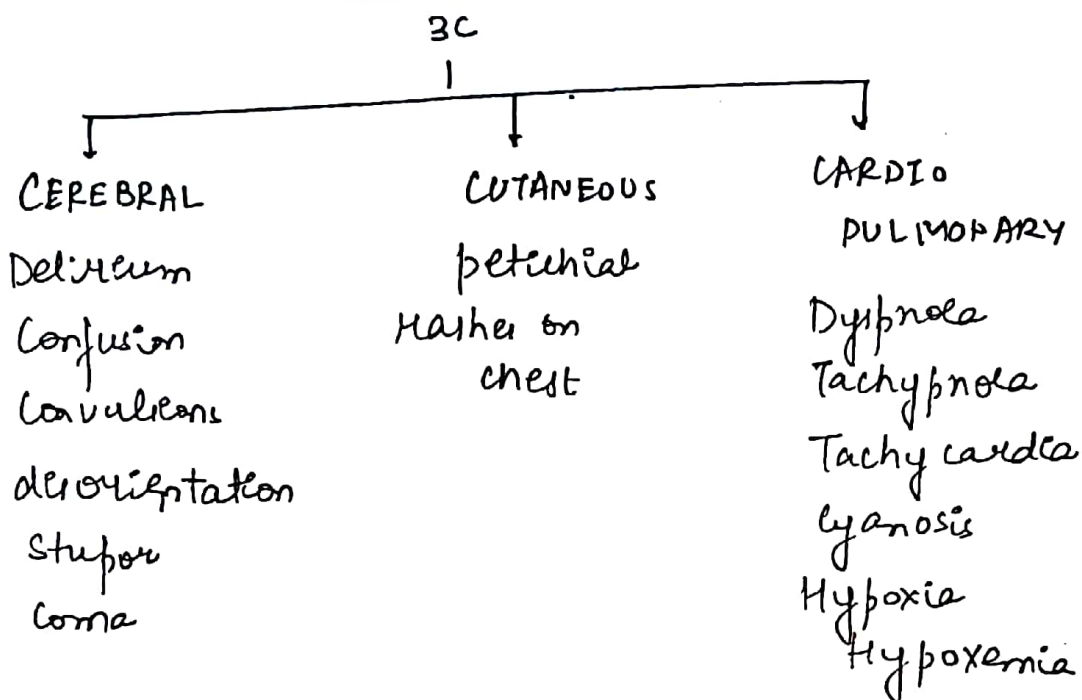
Nailing

# FAT EMBOLISM SYNDROME

Young ♂ (20s - 30s)

# SOF - >48-72 hrs

## BERGMANN'S TRIAD



Mx = 1) O<sub>2</sub>

2) I.V. fluids

3) Forced alkaline diuresis

4) I.V. steroids to counter chemical pneumonitis

5) Pulmonary embolotomy

6) Heparin (Double edged sword)  
     ↓  
     Lipase  
     used for limited pts

10µ  
2x5µ

WADDELL'S TRIAD

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

Sequence of Cond<sup>n</sup> presenting  $\bar{c}$  shortening  $\bar{c}$ : AIIMS May 2015

P.H.D. > #SOF > Subtrochanteric # > #ITF.F > #NOF

LIST-21 ANGLES IN ORTHO

Cobb's  $\angle$  :- Scoliosis

K  $\angle$  - Dickson's / Kyphosis  $\angle$  = Pott's spine

Q  $\angle$  - Quadriceps  $\angle$  = Recurrent patellar Dislocation

Paulwel's  $\angle$  - } NOF #

Garden's  $\angle$  -

Bauman's  $\angle$   $\rightarrow$  Supracondylar # Humerus

Bohler's  $\angle$  } # calcaneum  
Lissane's  $\angle$  }

Meary's  $\angle$   $\rightarrow$  pes cavus

Kelci's  $\angle$  CTEV / clubfoot



## LIST - 22 X-RAY VIEWS

Judet view - # Acetabulum

Zanca view - AC Joint

Stryker notch view - Hilsach's Lesion

West point Axillary view - Bankert's Lesion

oblique/PA view w/ulnar deviation  
- scaphoid

Von Rosen view = DDM

Merchant's view = Patellar subluxation

Mortise view = Ankle AP view in 15° Internal  
Rotation

↓  
Syndesmotic Injury  
↓  
(Inf. Tibiofibular Jt)

Canale view - # of Talus Neck

Harris • Broden view - # Calcaneum

Serendipity view - Sternoclavicular Jt

Bow Cather'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

Aeroplane splint - Brachial Plexus Palsy

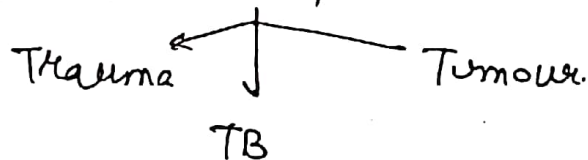
Turn Buckle splint - vic. (Mild) Volkmann's Ischaemic Contracture

Coaptation splint - # shaft of ~~fore~~ humerus

Paulek Harness }  
 Von Rosen splint }      DPH

Ankle Foot orthoses - Foot Drop

Taylor's Brace - Thoracic Spine



## LIST-24      CASTS IN ORTHO

Hand Shake Collie's #

Glass Holding # scaphoid

Cylinder / Tube # Patella

PTB (patellar Tendon Bearing) # shaft of Tibia

Minerva cx Spine Injury

Risser's Scoliosis

U/ Hanging cast - # Shaft of Humerus

Turn Buckle cast → Scoliosis

## LIST- 25

TRACTIONS

Dunlop - supracondylar # Humerus

Smith's        "       "

Crutch Field Tonge }  
Garden wells        } Cx spine injury

Gallow's }  
Bryant's } # SOF in age < 2 yrs

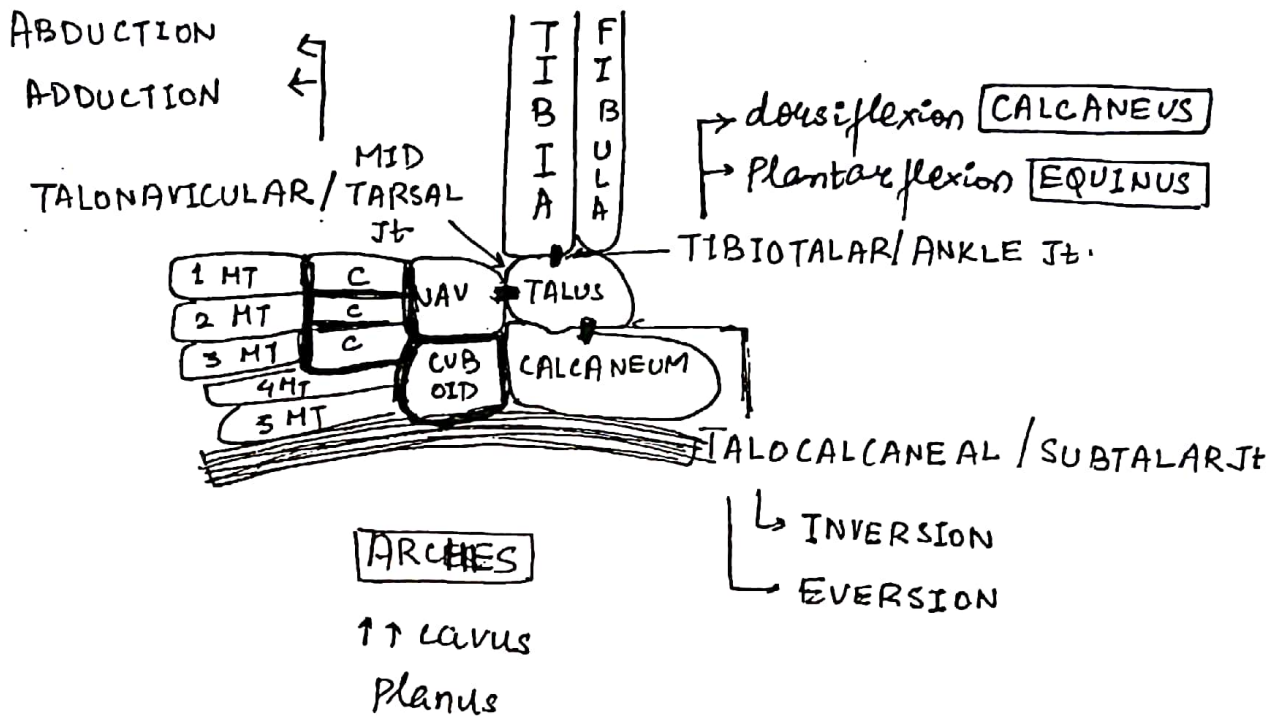
Peterson's - # SOF in adults

Buck's - Modified skin traction for LBP

Agnes Hunt - Flexion deformity of hip.

# ANATOMY

ADD<sup>N</sup> + INV<sup>N</sup> → VARUS  
 ABD<sup>N</sup> + EV<sup>N</sup> → VALGUS



## C. T. E. V. / CLUB FOOT

Def<sup>n</sup> :- Congenital malformation of Ankle, Leg, Foot  
 complex characterised by

varus  $\left\{ \begin{array}{l} \text{Cavus (↑ arch of foot)} \\ \text{Adduc<sup>n</sup> (⊙ Talonavicular Jt)} \\ \text{Inversion (Talocalcaneal Jt)} \\ \text{Equinus (Tibiotalar Jt)} \end{array} \right.$

Statistics :-

Incidence  $\frac{1}{1000}$

$\sigma : \phi = 2 : 1$

M/L cause = Idiopathic

M/c association = Neural Tube Defect  
 (Spina Bifida occulta S<sub>1</sub>)

B/L - 50%

Asians = Western.

(PITX-1). (TBX-4) gene pathway

### PATHOGENESIS

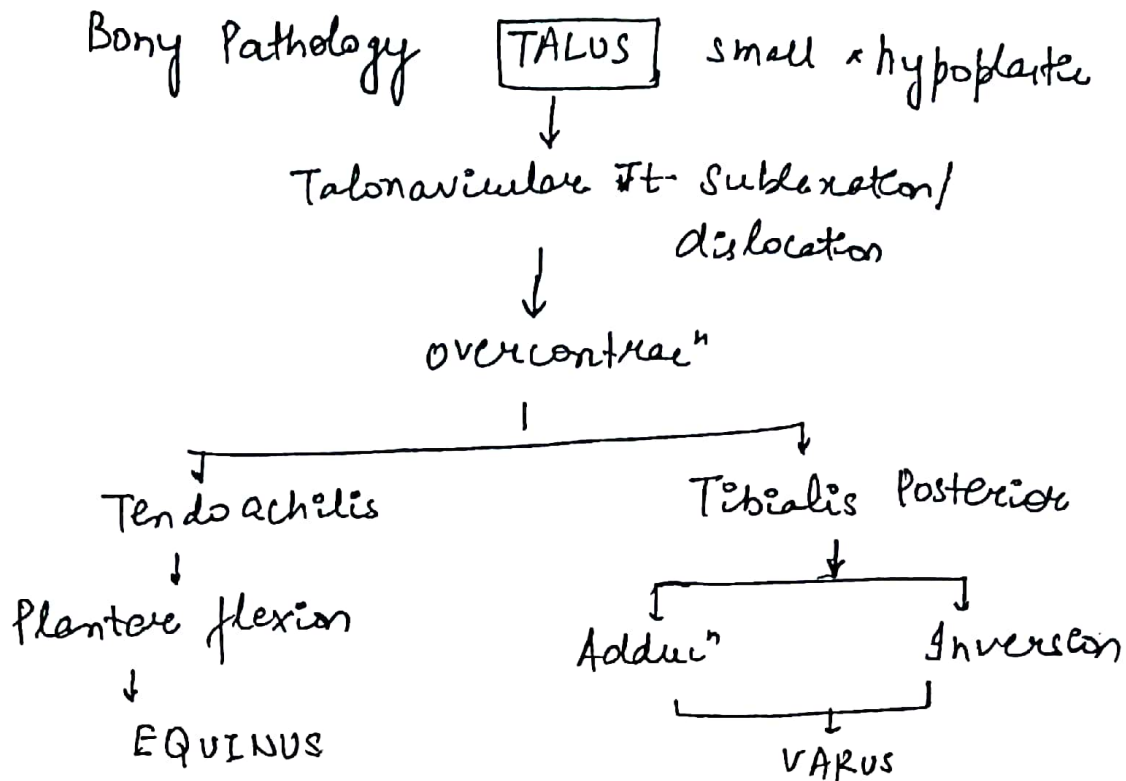
#### Theories

Developmental arrest theory

Myofibroblastic theory

1<sup>o</sup> germplasm defect theory





CLINICAL SPECTRUM → Dorsiflexion Test (+)

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

X-RAY - KITE'S ANGLE / Talocalcaneal Angle

(N) 30-55°

Δste - <25°

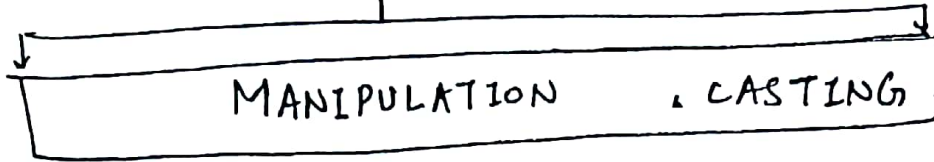
Mx (I) At Birth - Infancy (0-1yr)

PONSETTI TECHNIQUE

DR. IGNACIO PONSETI → Date of Birth

3<sup>rd</sup> June

Club foot day



By Doctor

Not by mother

Reversal of deformity

Started as soon as possible after birth

By Doctor

1st Cast

↳ Lanugo/umbilical stump sheds off

5-7<sup>th</sup> casts

Serial weekly Basis

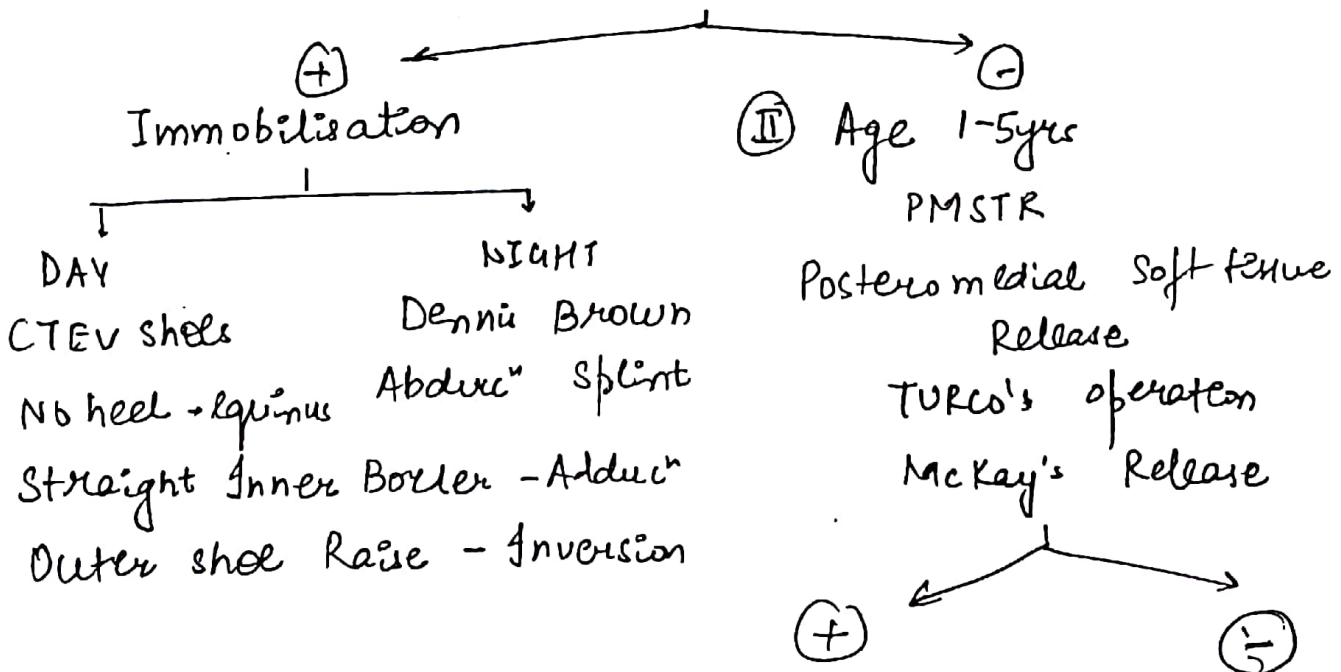
FULCRUM - Head of Talus

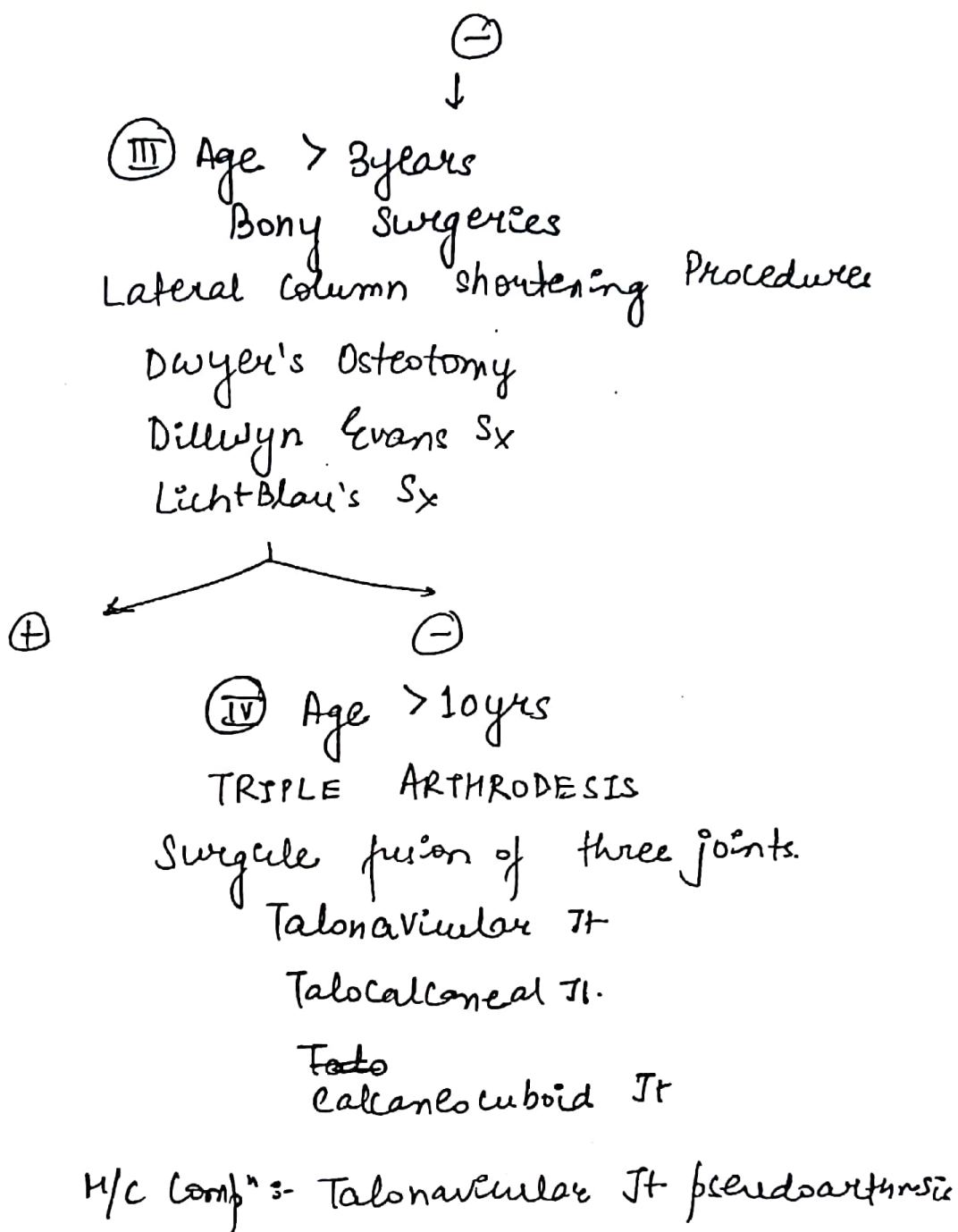
AIM - Talonavicular Jt. Reduction

SEQUENCE:-

CAVUS → VARUS → EQUINUS

PONSETTI'S TECHNIQUE



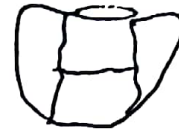


## LIST-26 # 1 INJURIES & EPONYMS

### 1) O'DONOGHUE'S UNHAPPY TRIAD

Injury to

- ← A.C.L
- ← M.C.L
- ← M.M



### 2) JUMPER'S #

(H) shaped sacral # due to fall from height

### 3) JUMPER'S KNEE

Tendinitis of patellar lig (Lig patellae)

### 4) SINDING LARSEN JOHANSSON SYNDROME

partial rupture/avulsion of patellar Tendon  
from lower pole of patella → Trauma

Tendinitis in lig. patellae

### 5) BUMPER'S #

# Lateral condyle of Tibia



### 6) SEHOND'S #

# Tibial condyle extending into  
Tibial spine → ACL tear

### 7) TODDLER'S # / CAST #

Children

fall from height

Spiral #

Tibia

87 AVIATOR'S #

# Neck of Talus

TALUS

- 1) Retrograde blood flow
- 2) Max. wt bearing bone of Body ( $\text{Kg/cm}^2$ )
- 3) No m/s attachments
- 4) SQUATTING FACETS \*

# NECK of TalusAVN appears in 4-6 wks  $\rightarrow$  disappearsM/c Comp<sup>n</sup> -  
Subtalar  
arthritesBody of  
Talus

HAWKIN'S SIGN

Good X-Ray sign = Revascularisation

9) LOVER'S # / DONJUAN'S #

Intraarticular # of calcaneum  
due to fall from height  
Usually B/L



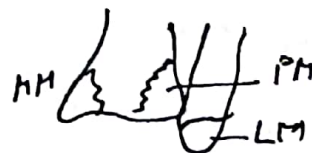
M/c Complication = Malunion

X-RAY  $\rightarrow$  Bohler's  $\angle$   $\odot$   $20-40^\circ$   $\downarrow$

Crucial angle of  $\odot$   $100-145^\circ$   $\uparrow$   
Gissane

10) POTT'S #

Medial &amp; Lateral malleolus #



11) COTTON'S #

Medial Malleolus + LM + PM



12) PILON'S #

Intraarticular # of distal tibial plateau (distal tibial articular surface) & metaphyseal comminution.

13) HOFFA'S

Coronal plane # of one or ② femoral condyles



14) NUTCRACKER'S #

Intraarticular # of cuboid

15) LISFRANC'S # DISLOCATION (T.M.T.)

Tarsometatarsal Jt. # Dislocation

16) CHOPART'S # DISLOCATION (I.T.)

IntraTarsal Jt. # dislocation.

17) RUNNER'S #

Spiral # of distal Fibula (hairline)



18) JONES #

# of 5<sup>th</sup> Metatarsal @ metaphyseal/epiphyseal jn.

JMD - Jones Mete

19) PSEUDO JONES # / DANCER'S # / TENNIS #

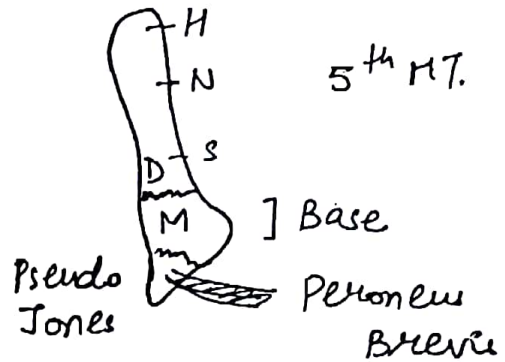
# of 5<sup>th</sup> Metatarsal @ tuberosity / tip of due to violent pull of Peroneus Brevis

TENNIS ELBOW

Lateral epicondylitis

M/C  $\Rightarrow$  E.C.R.B.

Extensor Carpi Radialis Brevis



GOLFER'S ELBOW = Medical epicondylitis.

In Golfer Tennis elbow > Golfer's elbow

TENNIS LEG  $\rightarrow$  Rupture of medial head of Gastrocnemius

20) STRADDLE #

B/L Sup- & Inf ~~pubic~~ pubic rami #

21) DUVERNEY'S #

Crescent shaped Iliac wing #

22) MARCH #

Stress # of <sup>shaft</sup> 2<sup>nd</sup> Metatarsal

