

ORTHOPEDICS

Nerve Injuries and Compression

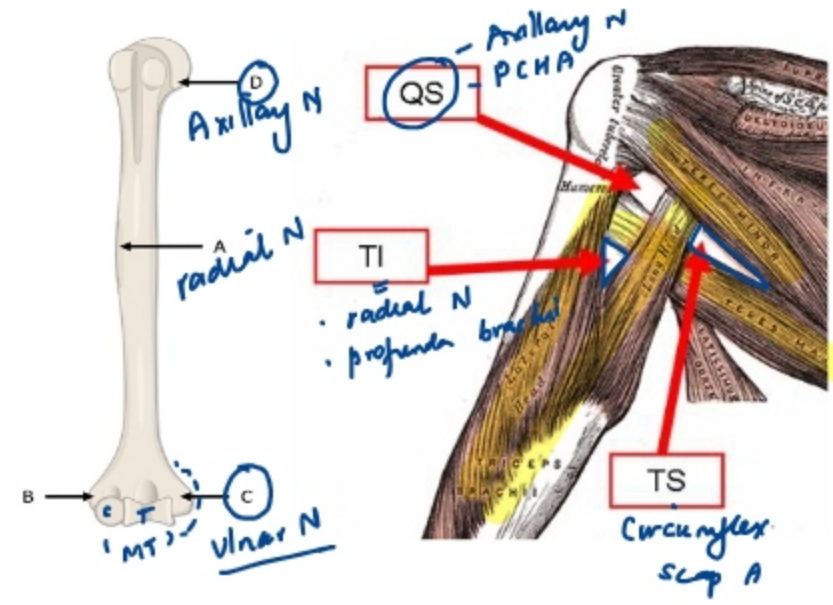
0-15° → SSP
 15-90° → Deltoid
 overhead → serr ant 1 Trapez

- Shoulder dislocation, Neck of humerus: Axillary N > Musculoant N
- Quadrangular space: Axillary N
- Holstein Lewis #: radial N
- Monteggia #: PIN
- Supinator syndrome: radial N
- Pronator syndrome: median N
- Wrist dislocation, Carpal tunnel: median N
- Supracondylar #: AMRV (AIN > median > radial > ulnar)
- Lateral condylar # - Cubitus valgus: tardy ulnar N palsy
- Elbow dislocation, Cubital tunnel
- Guyon's canal (hook of hamate #): ulnar N
- Cheralgia paraesthetica / Wartenberg syndrome: radial cut N
- Meralgia paraesthetica: LCNT (McRobert's)
- Piriformis syndrome: Sciatic N
- Tarsal tunnel: post tibial N
- Neck of fibula fracture, Lithotomy position: CPN < DPN - dorsiflexor
 < EPN - evertors



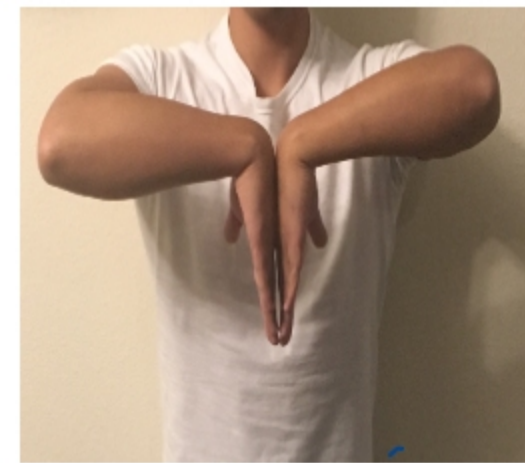
Deltoid -15-90° abd° Axillary N
 T.Minor - ER
 Lat arm sensation Regimental badge sign

Biceps → Erb's palsy Musculoant
 Coracobrachialis } flexion of elbow /
 Brachialis } supination
 Lat forearm sensation



↓ Foot drop / Steppage gait / high slapping
 → Toe raising splint

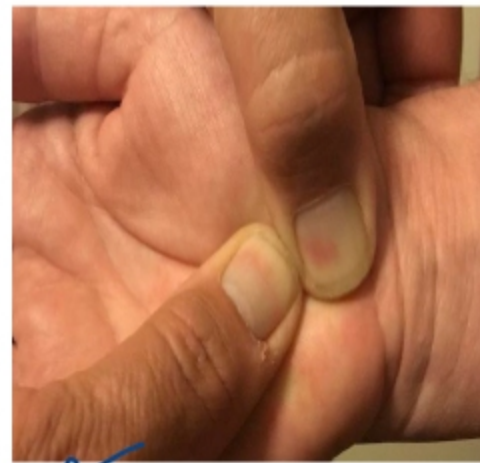
Clinical tests



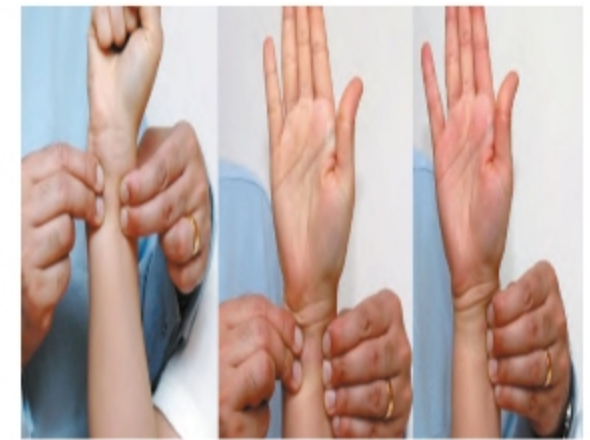
PHALEN'S



TINEL'S



Most sp: Durkan's



Mod. Allen's test -
palmar arch patency
↓
before arterial
puncture

median N - lat 3 1/2 digits
trecnar muscle exc add pollicis
Weakness

Seddon classific'n

Type	Nerve Continuity	Wallerian Degeneration	Recovery
Neurapraxia	(N)	No	Compression; 100%
Axonotmesis	axon broken	Sheath intact (≡)	regenerate 1mm/d
Neurotmesis	"	sheath broken (x)	Sx repair

Crutzer / Sait night palsy.
→ Progressive Tinel sign (+)
→ March (prox → distal)
Tinel + - stationary

Clinical tests

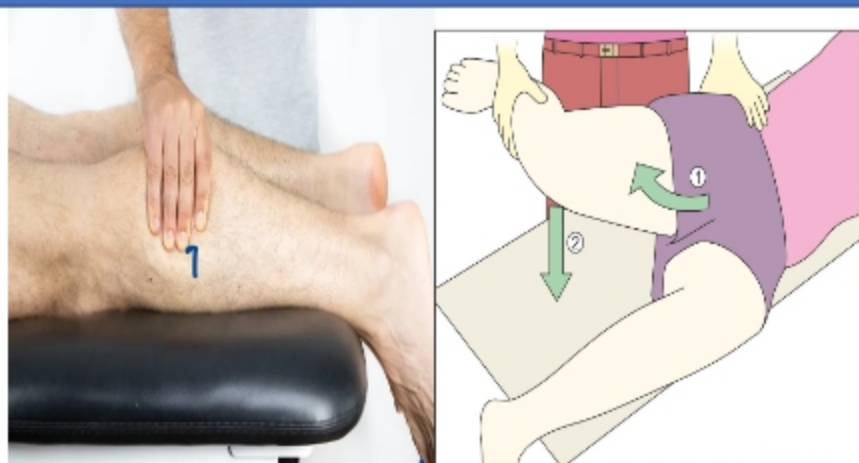


Iliopsoas - contracture
|
hip flexion

1st - check lumbar lordosis

1st - check L

THOMAS TEST

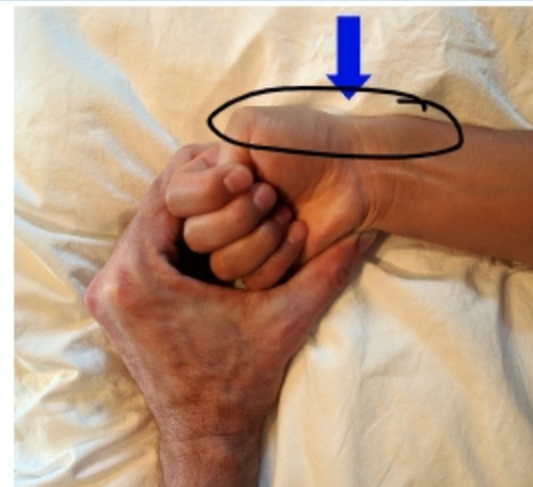


THOMPSON test
↓
Achilles tendon rupture
• Kwada staging
plantar flexion (N)

Ober's test
iliotibial band
contracture
/ TFL stiffness



Lat Epicondylitis =
Tennis elbow
[Med: Golfer's elbow]
ECR brevis MC



1st extensor:
AbPL / ex PB

De Quervain's
tenosynovitis
Frankelstein test

Eichoff test - pt provocative

Thoracic outlet syndrome



Roos / EAST



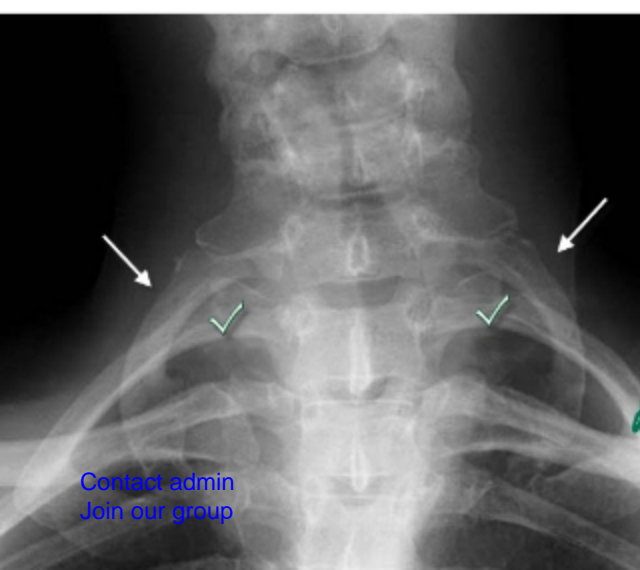
Adson test



Reverse Adson / Haltzhead



Weight (Mabdn)



Cervical rib
rib
(mcc of TOS)

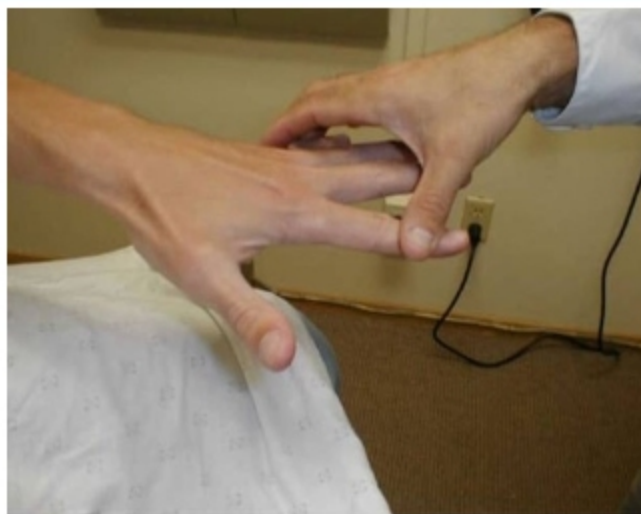
dx: clinical > 'dynamic' USG / MRI

mc: C8-T1 (lower trunk) > subclavian vein > subclavian artery

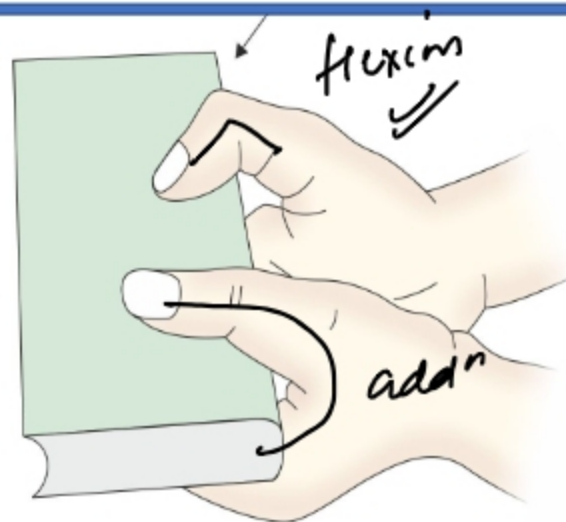
Upper limb nerve Injuries



Card test
PAD



Egawa test
DAB



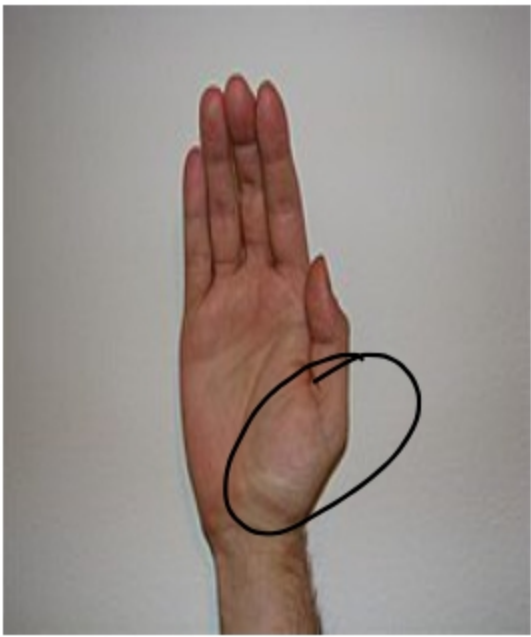
Book test /
Froment sign



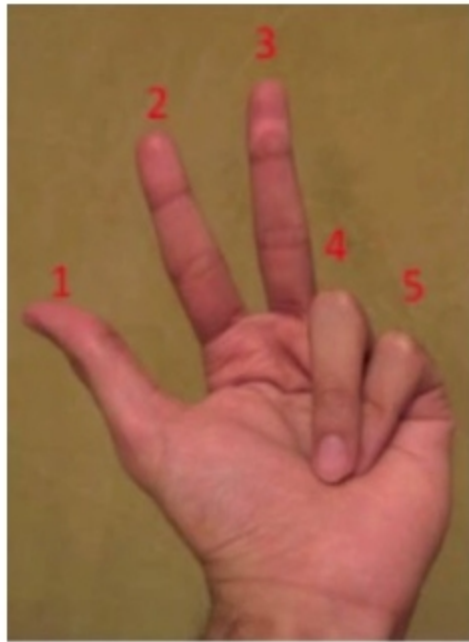
Waartenburg
sign

Ulnar N paradox: claw hand
 • wrist → FDP spared
 • elbow → FDP affected - claw hand
 looks ↓ severe

Ulnar N - adductor pollicis (graveyard)
 - PAD, DAB
 Hypomenar FDP - medial 2



Ape thumb

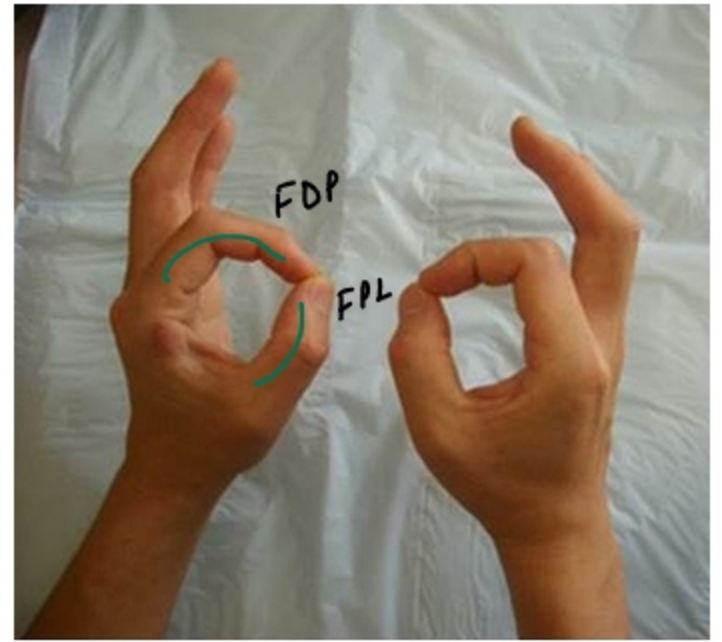


Make a fist

- Pointing index
- Benediction Pope
- Oscher clasp



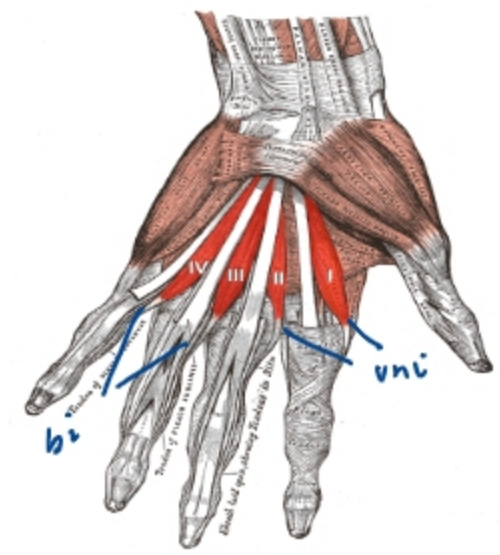
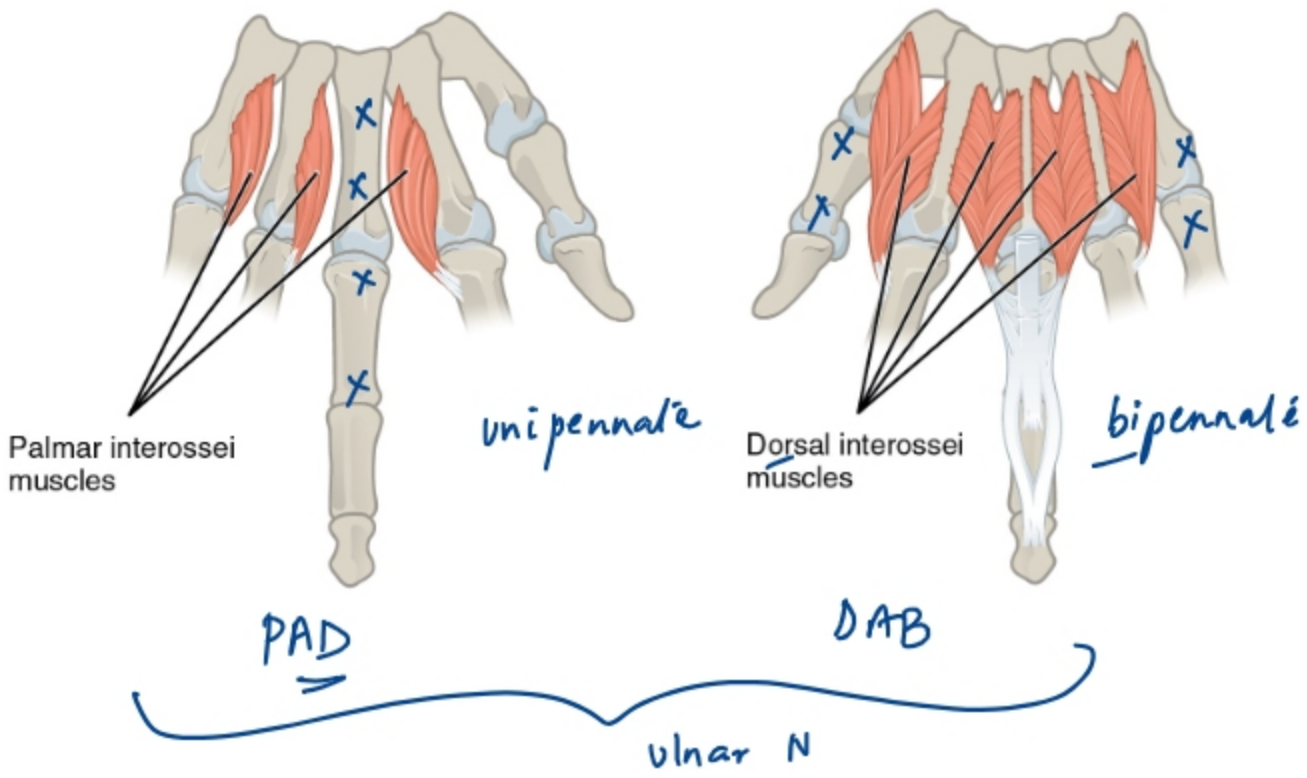
Pen test



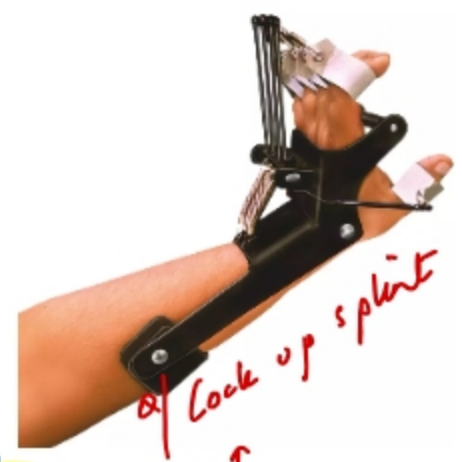
OK sign
Kiloh Nerve sign

AIN

Median N { FDP - lat 3 digits } AIN
 except adductor pollicis
 FDS
 Flexor



LUMBRICALS
 Origin-FDP tendon
 1,2: Unipennate - median
 3,4: Bipennate - ulnar
 Function: flex at MCP
 ext at IP



ROTATOR CUFF TENDONS:
 S → SSP → 0-15° abdⁿ
 I → Isp } ER
 T → T. minor }
 Subscapularis - LT → Addⁿ / IR
 Empty can test - SSP
 Forgotten tendon, Lift off test: Subscapularis
 Painful arc syndrome: 60-120° - Impingement
 Bursa: Subacromial
 Lmc: SSP

Klumpke's (C8/T1) → claw hand

Radial N palsy
 High (Axilla)- Elbow + Wrist + Finger drop + Sn loss
 Low (spiral groove)- Wrist + Finger drop + Sn loss
 PIN (Monteggia/Radial head)- Finger drop (pure motor)

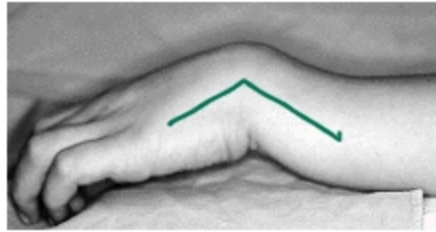
Fractures

NONUNION: FLUTS } AVN
 T } AVN
 NOF LCH } AVN
 ulna } AVN
 tibia lower 1/3 } AVN
 Talus } AVN
 scaphoid } AVN

MALUNION: MISC
 ITF }
 SCH }
 Colles' }
 clavicle }

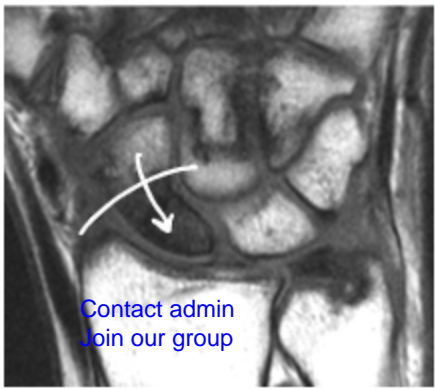
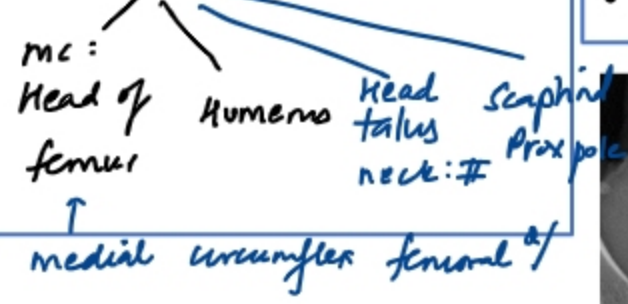
DEFORMITIES:

- Gunstock deformity: cub varus - SCH #
- Rx: French osteotomy
- Dinner-fork: Colles' #
- Garden-spade: Smith #
- Fish-tail: distal humerus #
- Madelung: wrist deformity - Turner's
- Haglund: high heels - calcaneal spurs
- Student elbow: olecranon bursitis
- Clergyman knee - Infrapatellar bursitis
- Housemaid knee - Prepatellar bursitis



IOC for AVN: MRI

Sites for AVN:



Classifications

AVN Hip

R/F → NOF # / steroids
sickle cell A/
Gaucher /
decompression



Bone infarcts

Pathological VS Stress fractures:

- bone abN
- mcc: osteoporosis
↓
mc site: vertebral
Compression
#
- pain precedes #
- stress abN
- loc: MRI
- mc: Mt neck > body
2 > 3
- Jogger's # - fibula

MIREL SCORE

> 8: prophylactic IF

Stage	Radiological Findings	FICAT & ARLET
I	Plain radiograph, MRI, and scintigraphy: Normal	
IIA	Sclerotic and cystic lesion	
IIB	Subchondral collapse (crescent sign) → decompression	
III	Irregular femoral contour	
IV	Collapse of the femoral head, osteoarthritis	

	1	2	3
Site	Upper limb	Lower limb	Peri-trochanteric
Pain	Mild	Moderate	Functional
Lesion	Blastic	Mixed	Lytic
Size	< 1/3	1/3 to 2/3	> 2/3

THR

Fracture Management

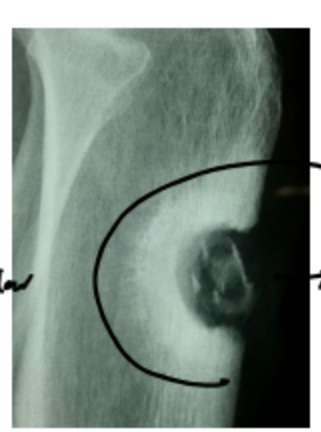
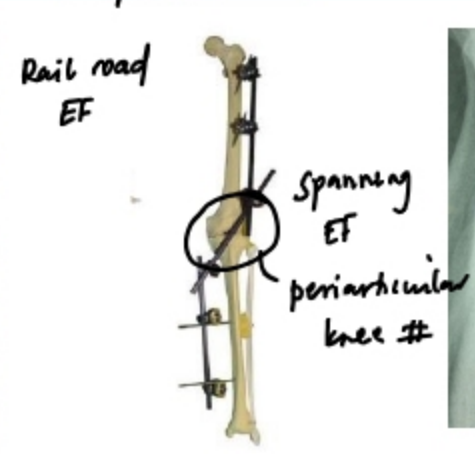
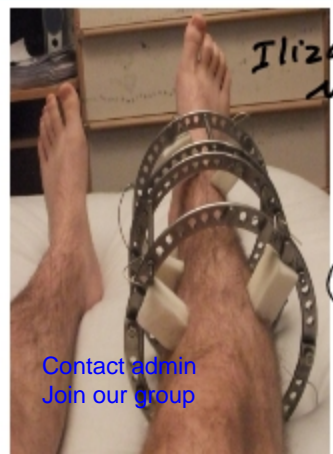
Primary bone healing: No callus - plating - no micromovts
 Secondary bone healing: Callus + - Nail/cast - ✓ micromovts
 Callus earliest: 3wks
 Delayed union: > 6mon
 Non-union: > 9mon

If operative Mx:
 Upper limb- OR + plating
 Lower limb- intramed nailing

Fractures of necessity

- Intra-articular fractures
 - Lateral condyle fracture humerus
 - Galeazzi fracture-dislocation
 - Monteggia fracture in adults
 - Fracture neck of femur
 - Displaced fracture of olecranon and patella
 - triceps
 - Quadriceps
 - Distracts → C Compressive
 - ↳ TBW (K wire)
- } R₀:
ORIF

Type	Characteristics Gustilo Anderson - open #
I	Puncture wound < 1 cm
II	Laceration > 1 cm but < 10 cm
III A	Laceration > 10 cm Segmental / comminuted fractures
III B	Periosteal stripping and bone exposure
III C	Vascular injury requiring repair <u>OR</u>



✓ Antibiotics, Debridement
 ✓ External fixator

Arrange the following external fixators used for treatment of fracture of tibia in order of increasing stability:

I. **Ilizarov**

II. Uniplanar frame with one rod

III. Biplanar frame

IV. Uniplanar frame with two rods

A. II, IV, III, I

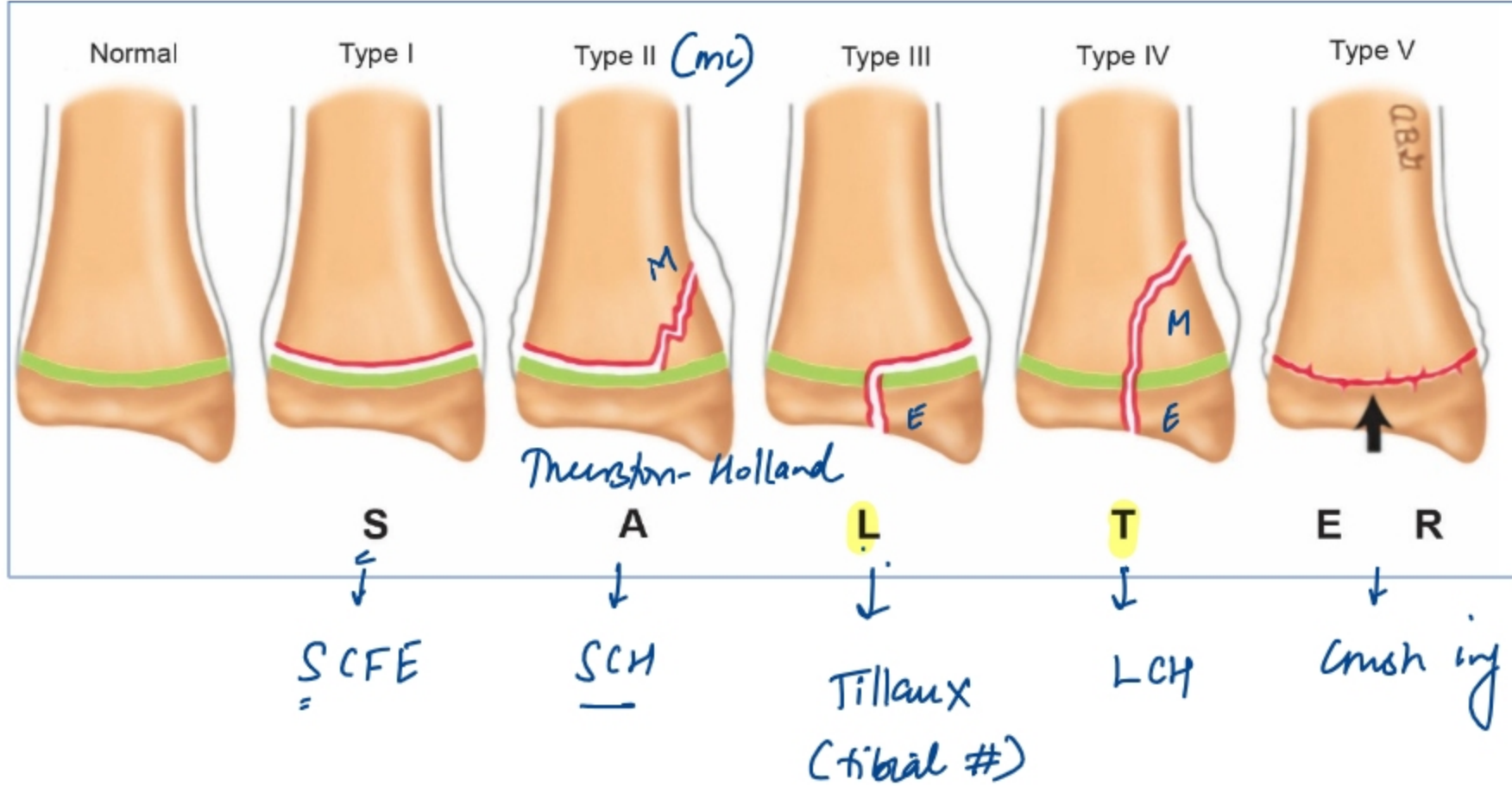
B. I, ~~III~~, II, IV

C. II, III, IV, I

D. I, II, ~~III~~, IV

Classifications

Salter-Harris

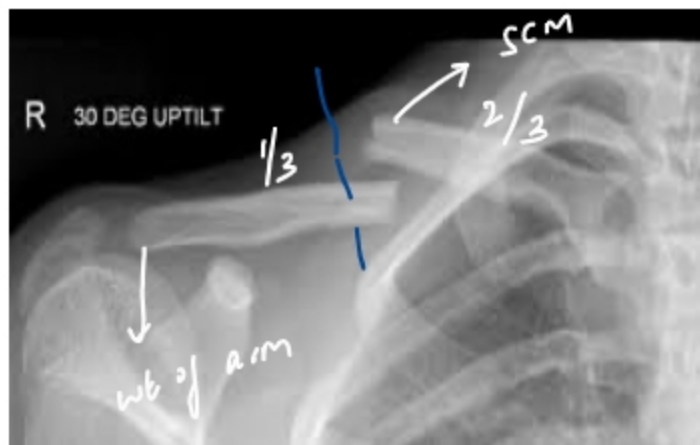


epiphyseal /
growth plate
injury

→ Hypertrophic zone^Q
→ Limb-length discrepancy

→ worse prognosis

PROXIMAL UPPER LIMB FRACTURES



CLAVICLE



figure of 8



Proximal Humerus #
NEER classifc



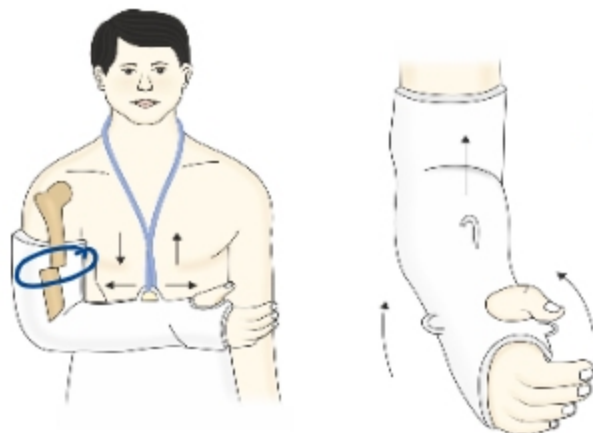
Holstein Lewis #
↓
Radial N

MC at birth, MC overall

Medial 2/3-lateral 1/3

FIGURE OF 8 bandage

Arm by side lifting shoulder & /



Hanging slab /

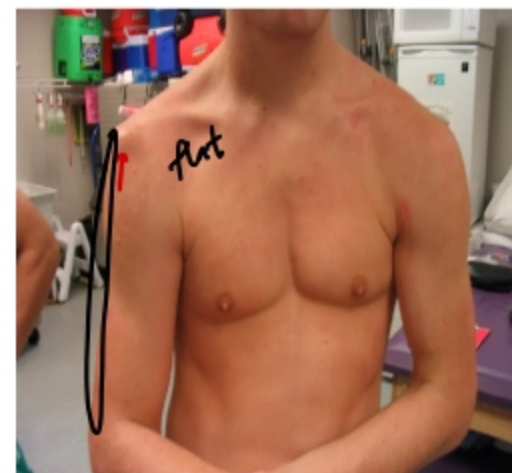
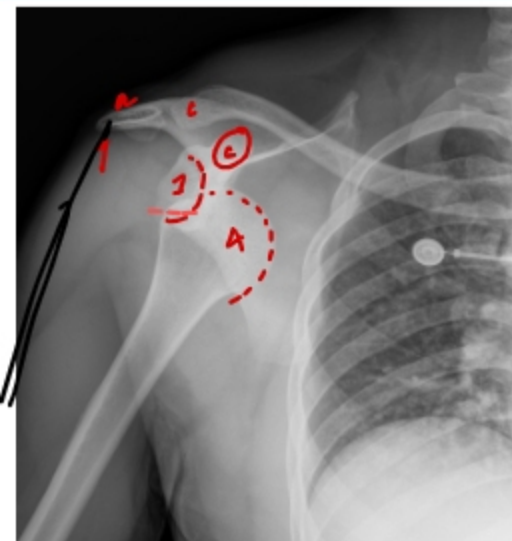
U slab

prox humerus #

SHOULDER DISLOCATIONS

mc adult
ant (mc)

; mc child : elbow



Recurrent shoulder dislocⁿ
↳ mc complicⁿ

• Bankart's - anterior glenoid labrum tear

• Hill sach's - posterolateral humeral head depression

Light bulb sign

↓

post dislocⁿ

ADIR

Sz / electrostim

Hyperabdⁿ

Luxatio erecta = inj dislocⁿ

TESTS:

Ruler touched acromion and lateral epicondyle

Difficulty touching opposite shoulder

Increased girth

Hamilton ruler

Dugas

Callaway's

Modified Kocher's:

Traction

ER

Addⁿ

MR

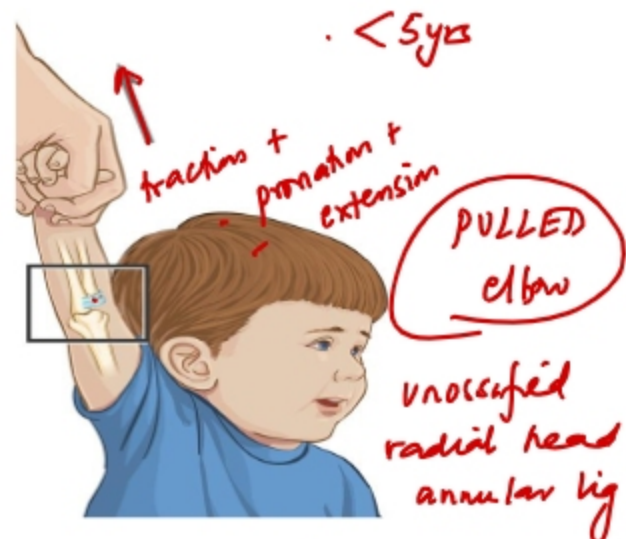
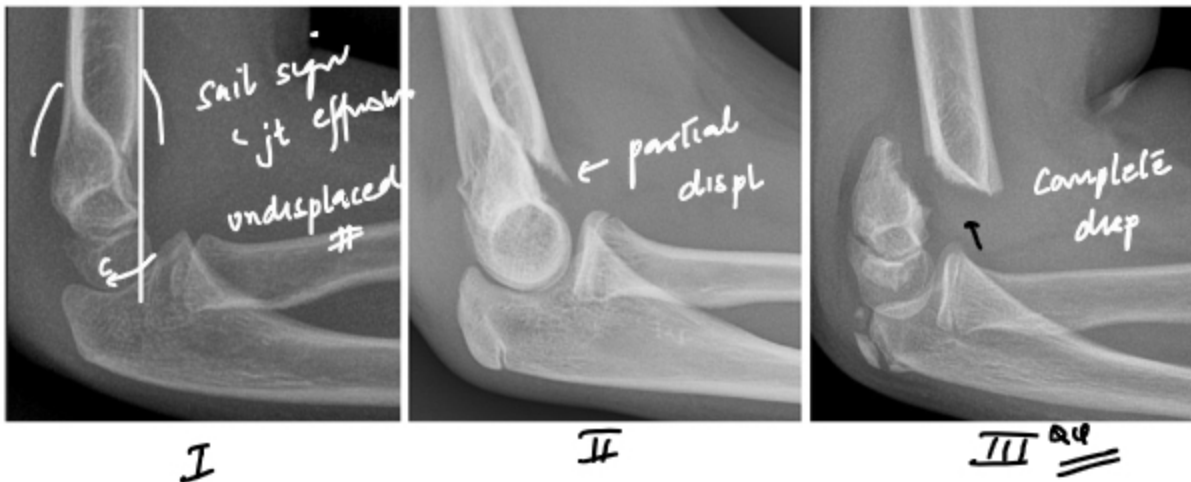
Ant dislocⁿ

↳ subcoracoid (mc)

Contact admin
Join our group

AMMCL: ABER

DISTAL ARM INJURIES



Gartland classify

LCH

Milch classification

Ro: flex elbow + supination
 < Hyperpron

SCH - children - FOOSH

Posteromedial displacement

Extension type

Baumann angle

3 point maintained

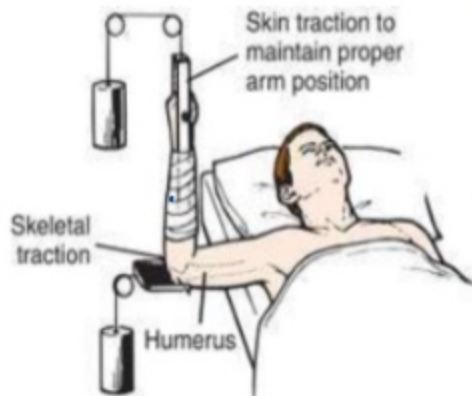
Vascular injury: Brachial A

Rx: CR + pinning

Pulseless / pale limb: Next → CR + pinning

Persistent Pale: Open expol → repair

SCH: Dunlop-Smithe



Terrible triad of elbow:

Elbow dislocation

Radial head #

Coronoid #

FOREARM



Ulna #
nightstick



unicortical #
greenstick #



TORUS /
Buckle #



Monteggia

Superior ulna # + radial head dislocation

↓
- PINI

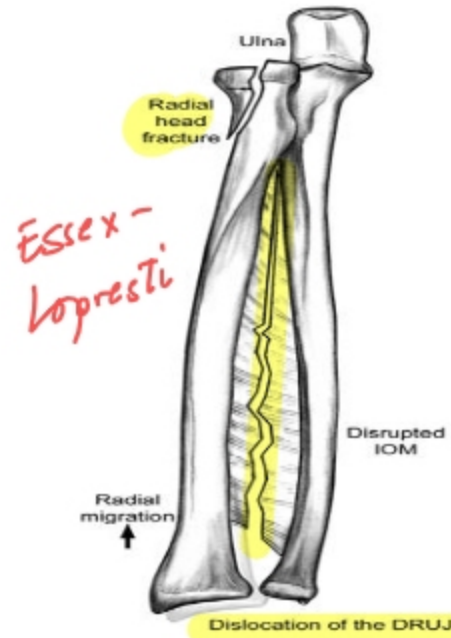
GRIMUS



Galleazi

Inferior radius # + radio-ulnar dislocation

✓ Piedmont #
Piano key sign



Children
(water ↑ - bones)

BADO classification: *Monteggia*

DISTAL FOREARM



Dorsal displ

Extra-articular

volar displ

Intra-articular

Radial styloid #

Scaphoid #

Terry Thomas sign

Colles' #

Smith #

Barton #

brachioradialis

tenderness in anat snuff box

X ray (N) → last - repeat x14d

postmenop ♀

FOOSH

Undisplaced:

Displaced:

MC tendon rupture in Colles'. Ext Pollicis longus

Glass holding cast

Herbert screws



Hand shaking cast
 PROPA - GUNDA
 Pronation → Palmar → ulnar
 Flexion → dev
 traction



DISTAL FOREARM



Bennet #



Base of 1st MC
Rolando #



BOXER'S #

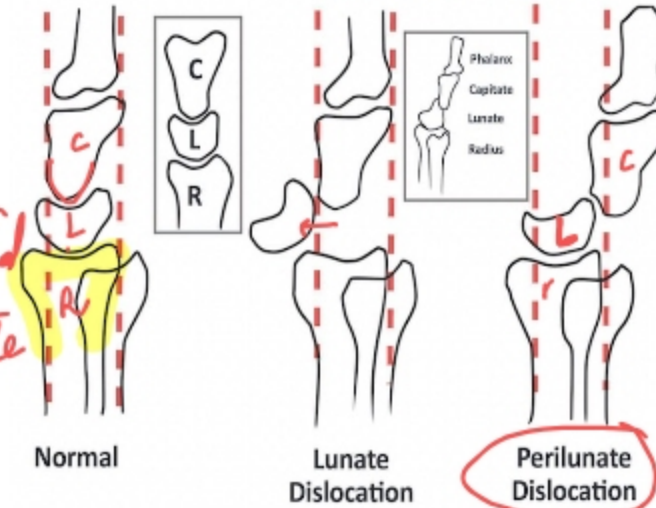


Lunate dislocⁿ

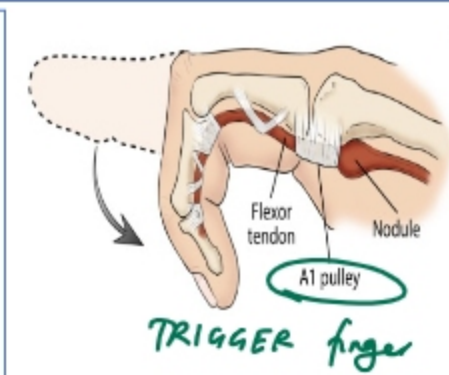
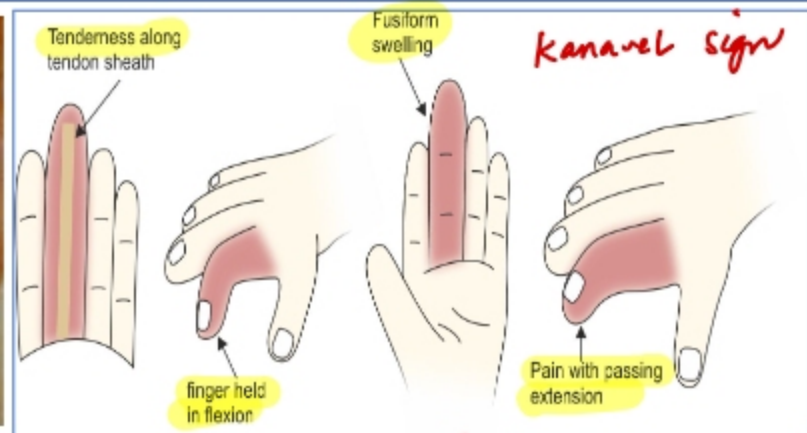
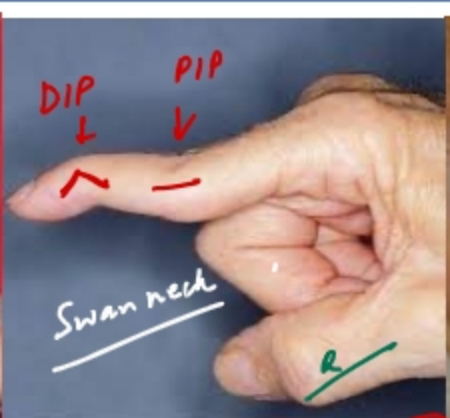


AVN Lunate
↓
Keinbock's

MC carpal # - scaphoid
dislocated - lunate



"Abnormal hands and fingers"



Diabetic cheiro-arthropathy
 - Prayer
 - Table signs

Swan-neck
 Flexion at DIP
 Ext at PIP

Heberden DIP
 Bouchard PIP

Suppurative tenosynovitis → S. aureus (mcc)
 Acute OM (Melenph)
 Paronychia - bed
 Felon - nail pulp
 Sickle cell - Salmonella
 nail inj / drug users - Pseudomonas



Mx: Traumb Spicax
 Sx: Steiner lesion: adductor pollicis entrapped

ulnar collateral lig avulsion
 Gamekeeper / Skier's thumb



Baseball / Mallet finger



Rugby - Jersey finger

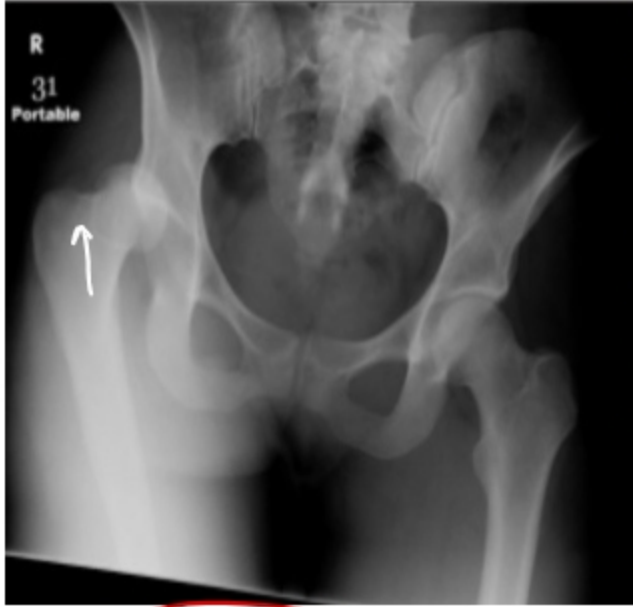


Dupuytren's Contracture
 - DM / cirrhosis
 - Ledderhose / Peyronie's (plantar fibrosis) penile plaque

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Bowler's thumb: ulnar digital N of thumb compressed (vs) MORTON neuroma → 3rd mt N fibrosis - Mulder sign

HIP DISLOCATION



FADIR



- Shortening
- small - head
- LT xx seen

POST (MC)

R/F - Dashboard inj
Sciatic N inj

FADIR:
TB hip arthritis
Posterior dislocation

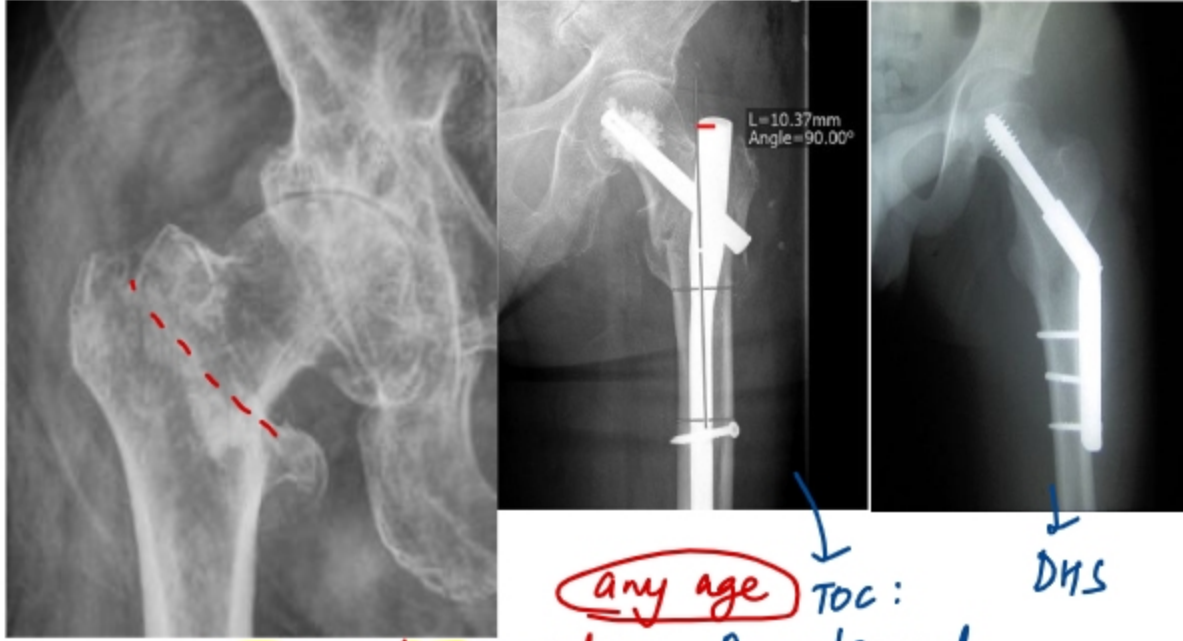
- Lengthening
- bigger head
- LT seen easily

ANT

FABER

FABER:
TB Synovitis
Septic arthritis
Iliotibial band contracture
Anterior dislocation

Neck of femur VS ITF



any age TOC: DHS
 Prox femoral nailing

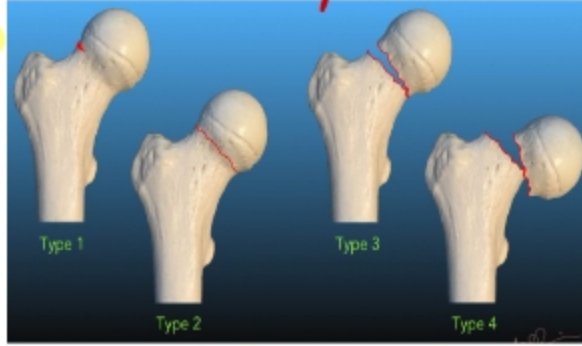
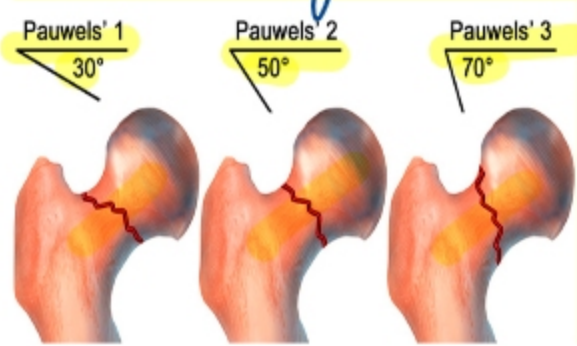
ITF = extra-capsular #

NOF management:
 >65yrs: Hemi-arthroplasty
 <65yrs, <3weeks: CR + IF
 <65yrs, >3weeks: augmented osteotomy
 w/o AVN



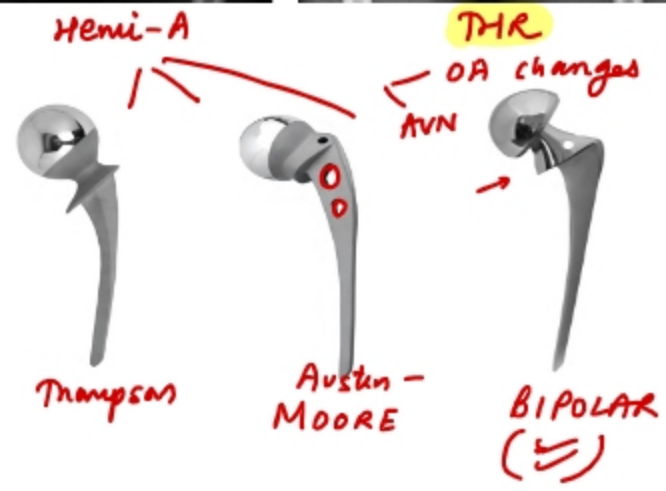
NOF = Intra capsular

More age
 More trauma
 More pain
 More shortening
 More ER >45 degrees
 Evan classification
MALUNION: Coxa vara

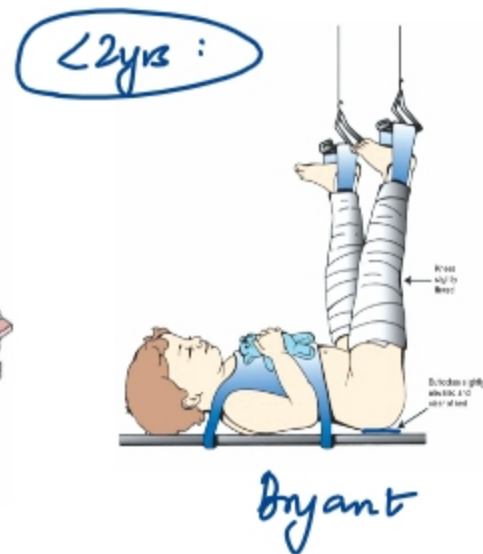
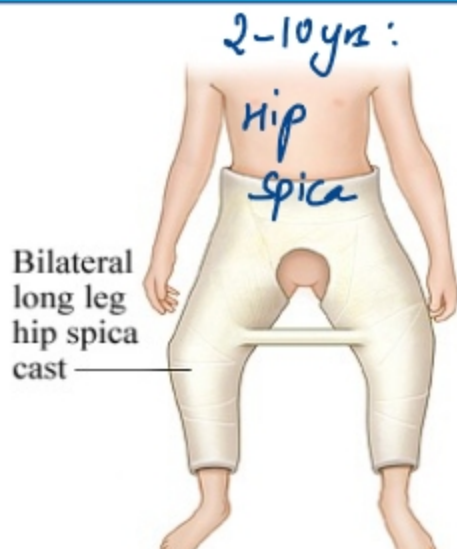


PIPKIN

Garden



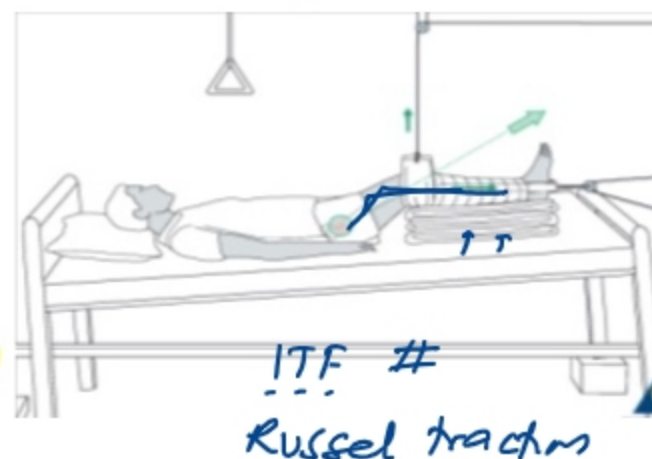
Shaft of femur # ~~Q1~~



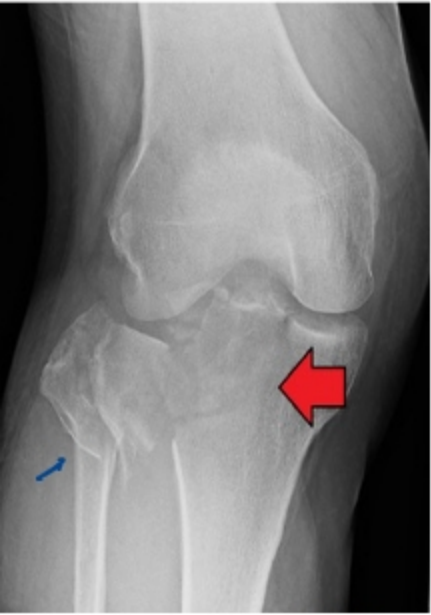
↑ r/o fat embolism

TRACTION

Age Group	Management
0-6 months	Pavlik harness
6m-5yrs	Spica casting
5-10yrs	Flexible intramedullary nails/ TENS titanium elastic nailing systems
>10 years	Locked intramedullary nail Q1



LOWER LIMB



Patella #

Bipartite patella
↓
Reassure

tibial plateau #
BUMPER #
Schatzker classifiⁿ

SEGOND #
↓
Lat capsular lig avulsion
· ACL injury - 80%
↓
MRI next

Pellaggrini - Steida lesion
↓
MCL avulsions

tibial tuberosity osteochondritis
↓
adolescent
↓
Osgood schlatter
↓



Undispl: cylindrical

Displaced: TBW

Fractures around the ankle



PILON #
Intraart - tibia



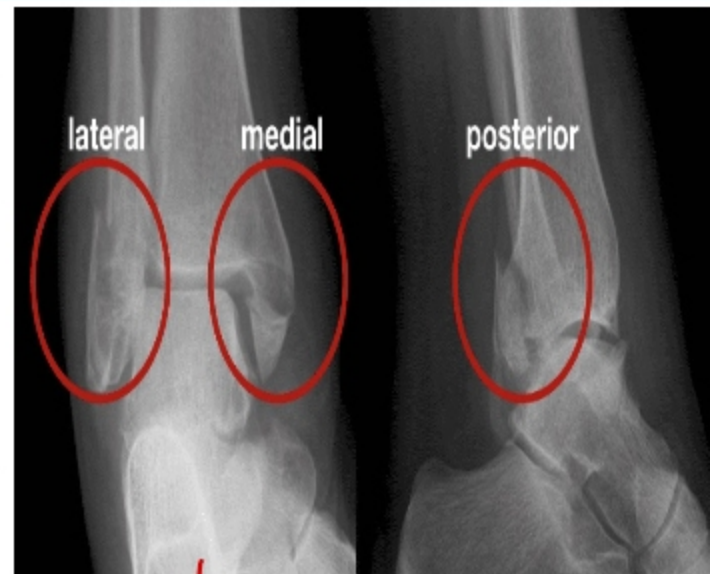
talus #



Calcaneal #



Calcaneal apophysitis -
Sever's D



lateral
medial
posterior
↓
bimalleolar :
Pott's

trimalleolar :
Cotton's

<p>Aviator fracture Classification: <i>Hawkin's^R</i></p>	<p>Lover's fracture Bohler: ↓ Gissane: ↑</p>
--	---

Jumper #: *SACRUM*

Denis classification: *SACRUM*

Judet and Letournel: *acetabular*

Young and Burgess: *Pelvic ring #*



Fractures of the foot



Inter-tarsal # - Dislocⁿ

T - MT

Jones' #

Pseudo-Jones'

Stress #

Chopart's

Lisfranc's

Dancer's #

Peroneus brevis avulsion

2nd mc

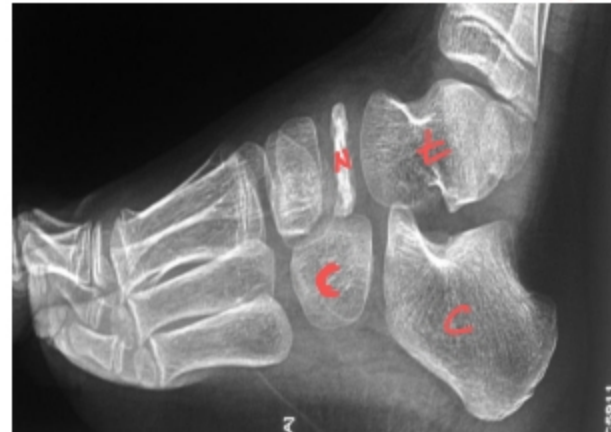
Amputations



mc: ATFL sprain

DANIS-WEBER: ankle #

OTTAWA RULES: Xray in suspected #

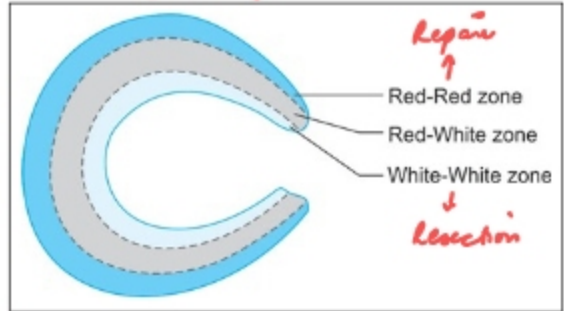


Kohler's
Navicular

SPORTS INJURIES OF KNEE



IOC: MRI
 Gold standard: Arthroscopy
 ACL: grafting (Hamstring)

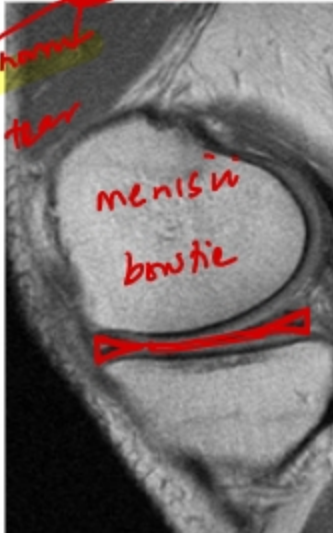


Ant drawer : 90° flex
Lachman : 20-30° flex



Apley's grinding test
 ↓
Messaly
 ↓
 Rotational stability

McMurray's
 ↓
 extension
 ACL mc
 ↓
 Cruciate lig: A-P stability
 Immed hemarthrosis

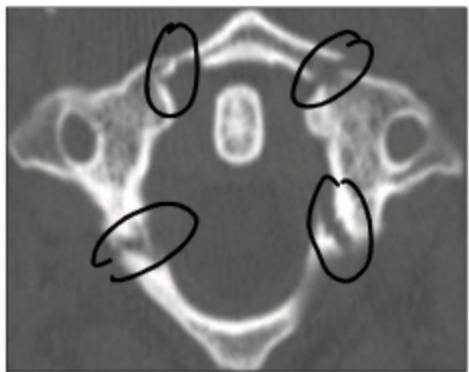


Valgus stress test: MCL
 Varus stress test: LCL
 Pivot shift test: anterolateral corner
 Dial test: posterolateral corner

O'Donogue triad:
MCL
ACL
Medial meniscus



SPINE FRACTURES



Atlas (C1)

Burst # =
Jefferson #
- stable



Spinous process C7 #
+
Clay Shoveller's #



C2-C3 #
pars interarticularis

Spondylolisthesis

Hangman #

axial loading + flex



Compression +
retropulsion
↓
Burst #



Chance #

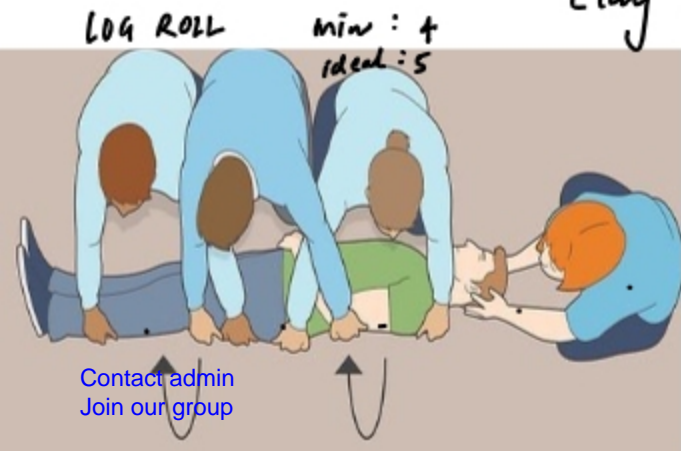
- flexion distraction

- 3 column #

- seat belt
Denis
≥ 2 ☹️



Ante spand
+
Carrot
stick #



SCIWORA:

Sc injury
- children

Cont

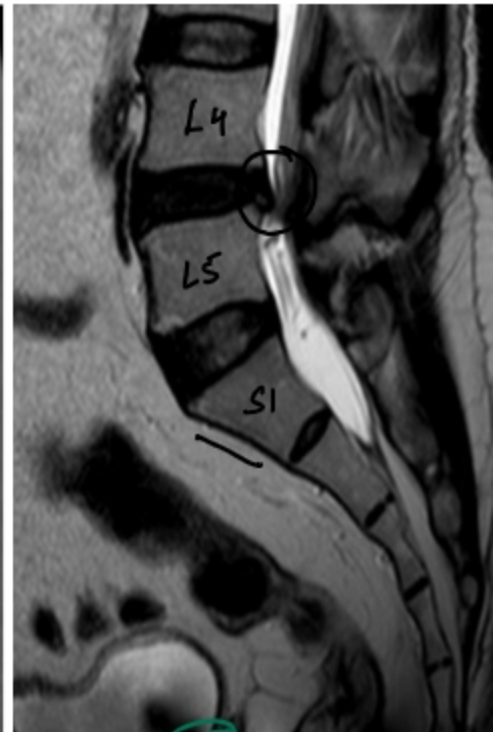
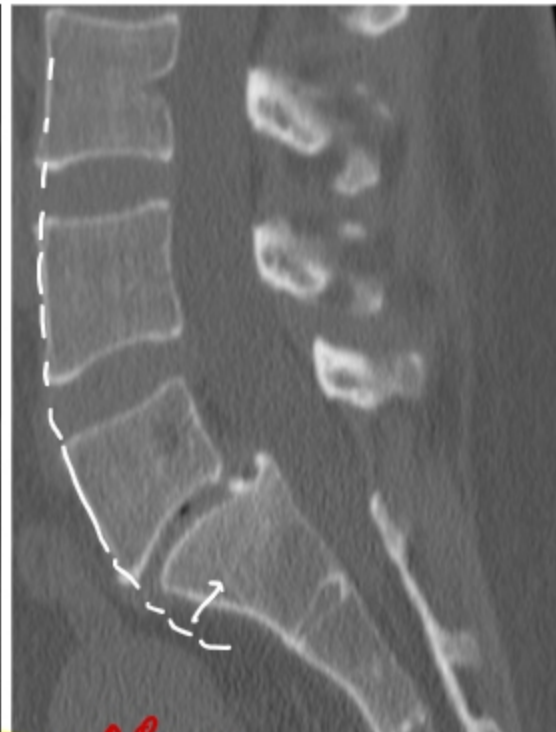
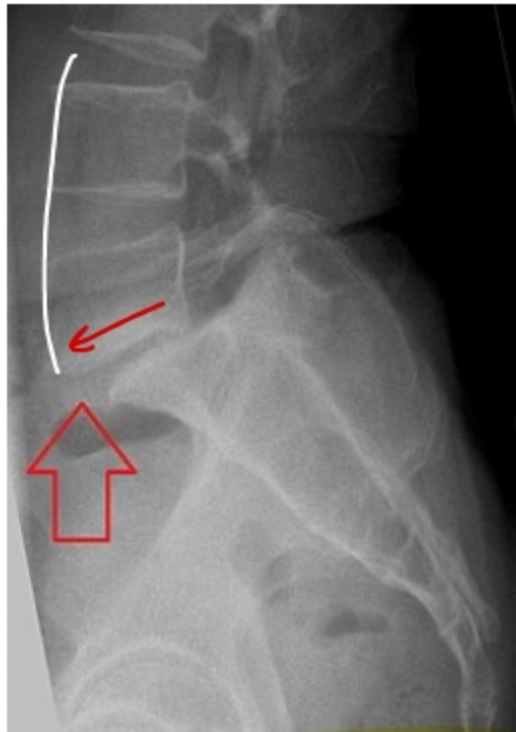
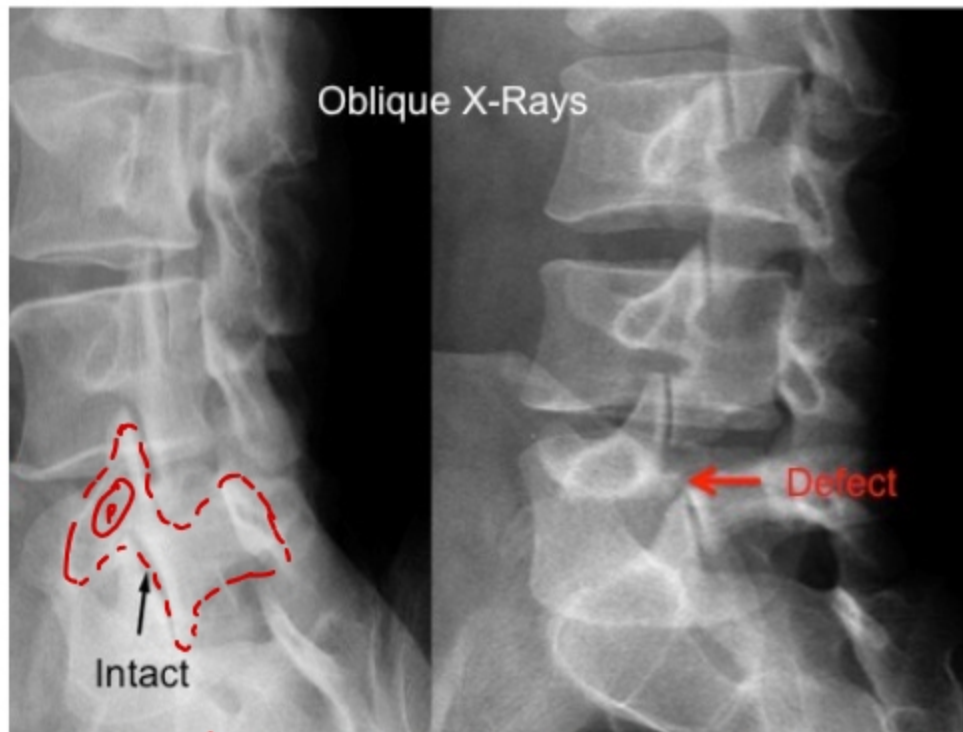
obvious

radiographic

abn

- LOC → MRI

SPINE FRACTURES



Scotty dog

oblique X-rays

Collared scotty
↓ dog

Spondylolysis

- pars interarticularis #

Spondylolisthesis

↓
beneathes scotty
dog

Neurogenic claud" - Lumbar canal stenosis

- Shopping cart sign / uphill ☺

L4-L5 disc prolapse

exiting root ↓ MC

traversing root

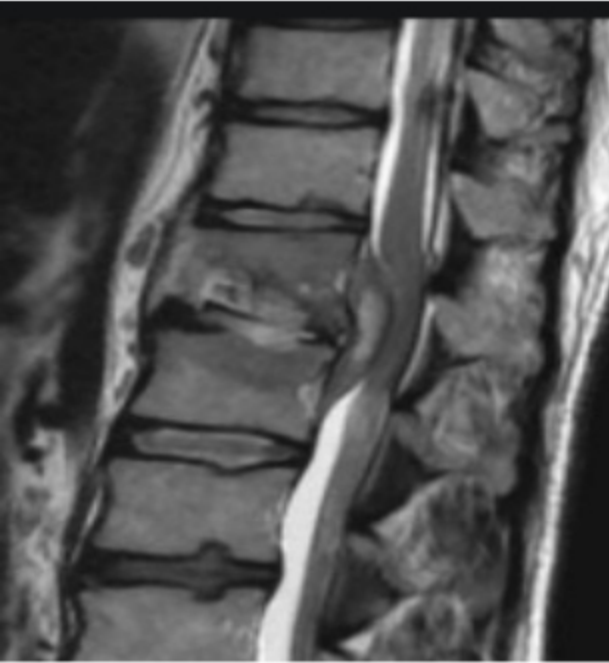


Pain on first step

Better on spine flexion

Contact admin
Join our group

BONE INFECTIONS

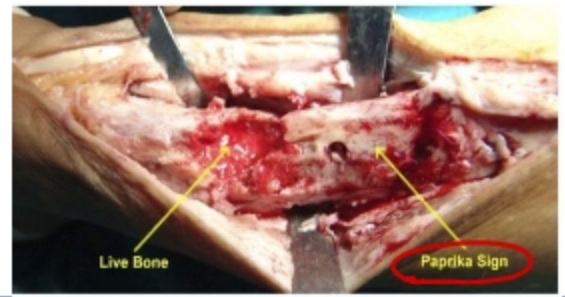


Paradiseal (mc)
 Pott spine & P
 MC: TB spine
 IOC - MRI
 R₂ - ATT 12-18mm + Taylor brace
 ↓x
 • Not improving - Dmg & suspected
 ↳ alternate dx
 • Weakness / neurological compression } Bx /
 on loss } Sx - antrolateral decompression
 • US / bowel Middle term Regimen: D.S.M. Tuli

Phemister's triad:
 Periarticular osteopenia
 Erosions
 Reduced joint space

TB Hip:

Subacute or
 BRODIE'S abscess



- Babcock Triangle: TB Hip (mc → acetabulum)
- Fairbank triangle: long coxa vara
- Ward triangle: osteoporosis

- Bony ankylosis: TB spine
- Fibrous ankylosis: TB jt - knee / hip

Contact admin
 in our group

SPINE XRAYS-APPROACH



1st: sacroiliitis
 MRI - STIR - most SN
 Mod. Schober test



syndesmophytes - tram track
 Bamboo spine - Dagger sign



Q: NSAIDs \rightarrow Biological - DMARDs

Young male with inflammatory backache - pain: \uparrow rest \downarrow activity
 HLA: B2*
 Uveitis
 B/L heel pain \rightarrow enthesitis
 Ankylosing spondylitis

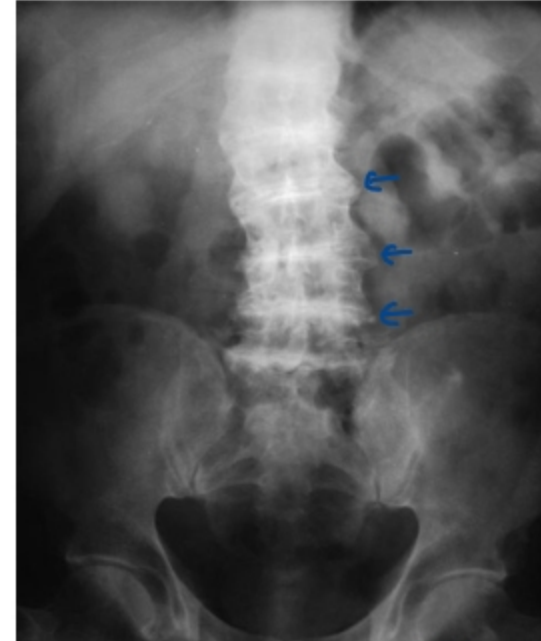


DISH - diffuse idiopathic skeletal hyperostosis

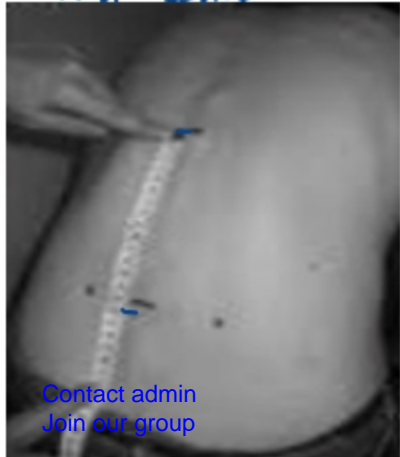
· flowing candle wax (+)
 · ALL

· elderly (>40-50yrs)
 · Forestier's D

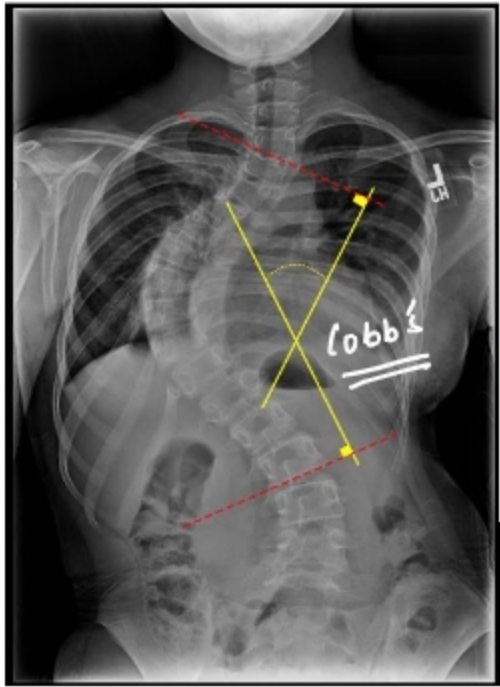
(vs)
 (DPLL = Japan's D \rightarrow SC compression)



in disc Ca^{2+}
 &
 Ochronosis
 - alkaptonuria



SCOLIOSIS



Lat curvature $>10^\circ$
 ↳ Scoliosis

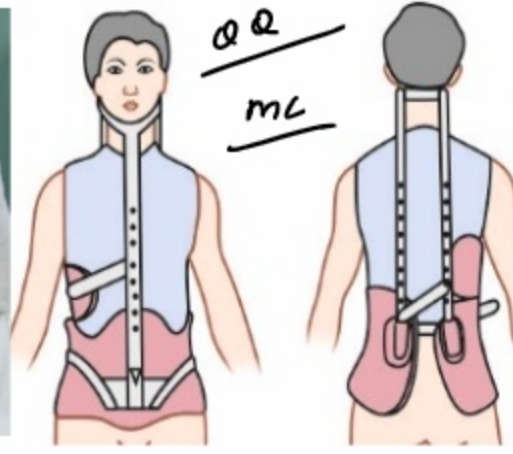


postural scoliosis structural scoliosis

Adam's forward bending test



Minerva cast



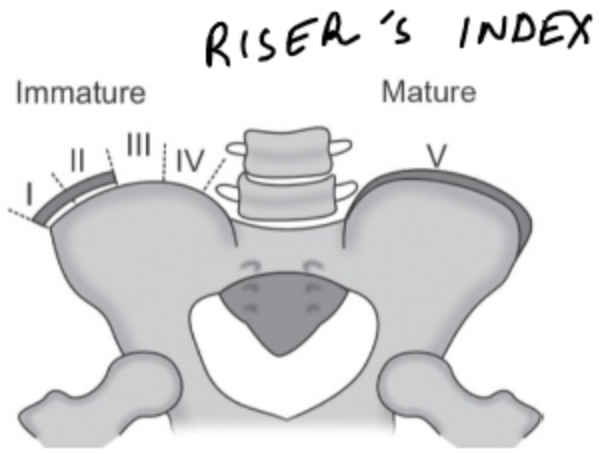
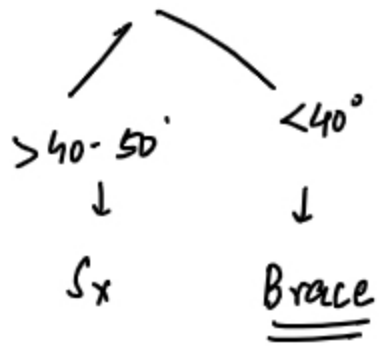
MILWAUKEE brace



BOSTON brace



Charleston
 ↳ most effective



BONE TUMORS

IBC - MRI

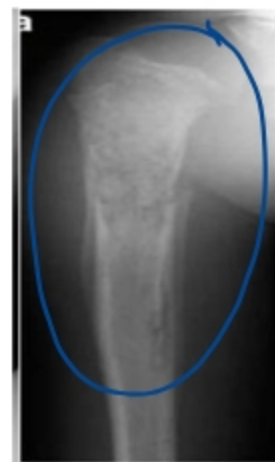
MC bone tumor: *Mets (lytic > Blastic)* *Breast / Prostate / Carcinoid*
 MC primary bone tumor: *Multiple myeloma*
 MC benign bone tumor: *osteochondroma*
 MC true benign bone tumor: *osteoid osteoma*
 Most chemo-radiosensitive: *Ewing sarcoma*
 Most chemo-radioresistant: *osteosarcoma*
 MC radiation induced tumor: "
 MC mets: *LUNG*
 MC bone to bone mets: *Ewing sarcoma / osteosarcoma*



geographic benign



moth-eaten aggressive



permeative

AGE

0 - 20 yrs
 ES osteosarcoma
 SBC/ABC

20 - 40 yrs
 GCT

> 40 yrs :- mets, MM
 Sarcoma
 Paget's, RT

LOCATION



AGGRESSIVE VS NON-AGGRESSIVE

- 1) Type of destruction
- 2) Zone of transition/ margins
- 3) Cortical integrity
- 4) Periosteal reaction
- 5) Soft tissue

well defn / narrow ☺
 ill-defn / wide ☹



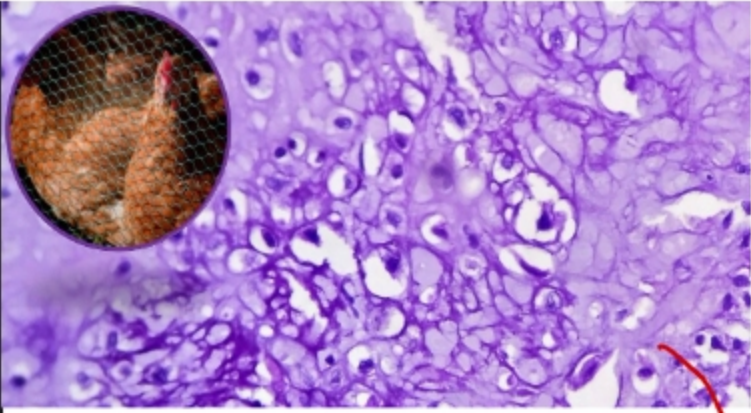
ocean peel → Ewing sarcoma - typical
 Aggressive
 osteoid osteoma
 osteomyelitis

Epiphyseal tumors

'ECG'



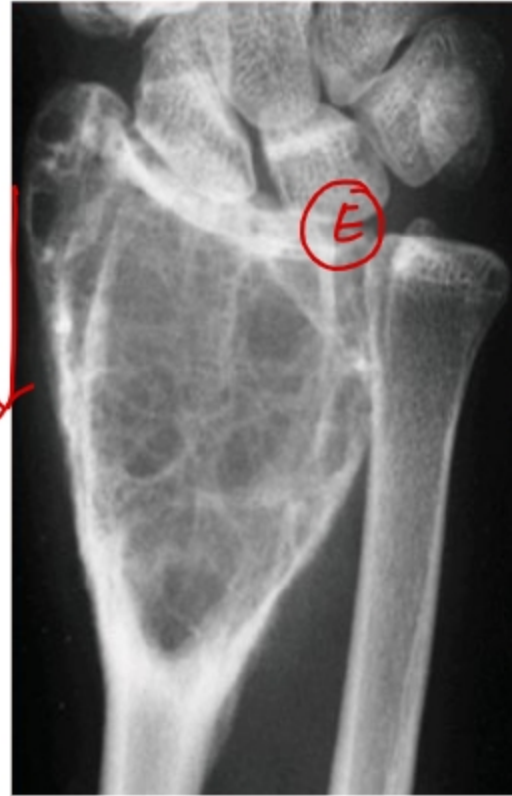
CHILD



Chondroblastoma /
Codman's tumor

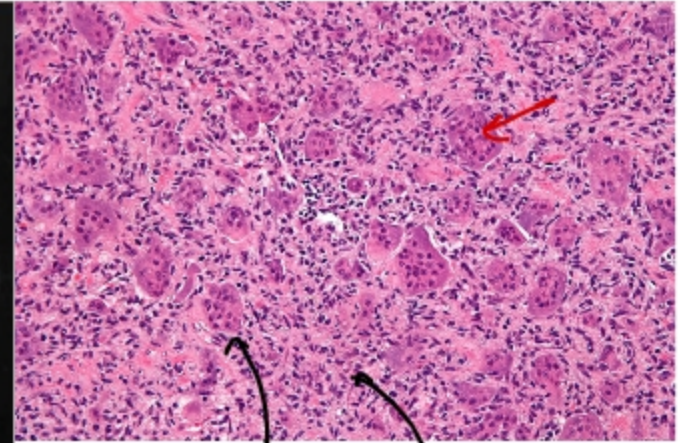
chicken wire
 Ca^{2+}

vs capillaries
LODQ

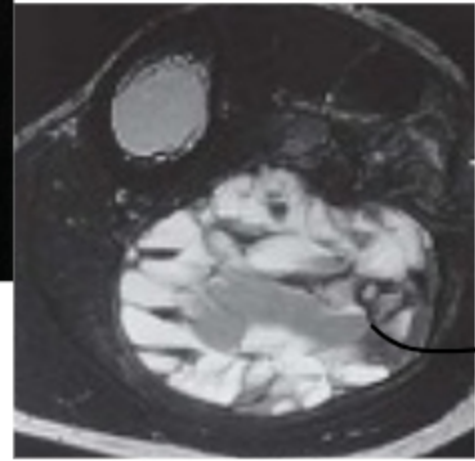


Soap bubble
30-40 yrs

GCT = osteoclastoma



O'clast
mononuclear cell
↓
malignant
=



fluid -
fluid level

↓
· D/D: ABC
· vascular mets
RCC / follicular
· telangiectatic os cca

What is the likely diagnosis based on the given image?

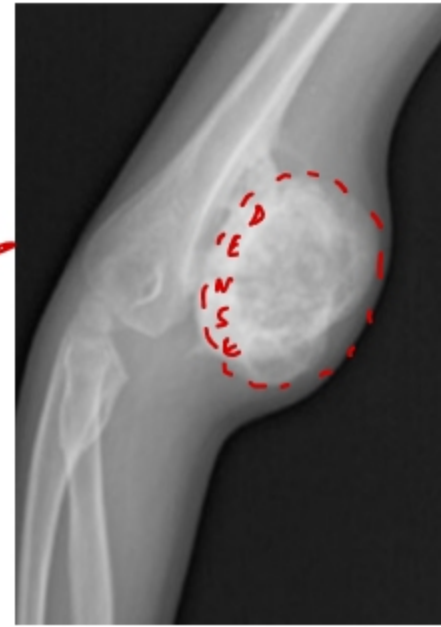
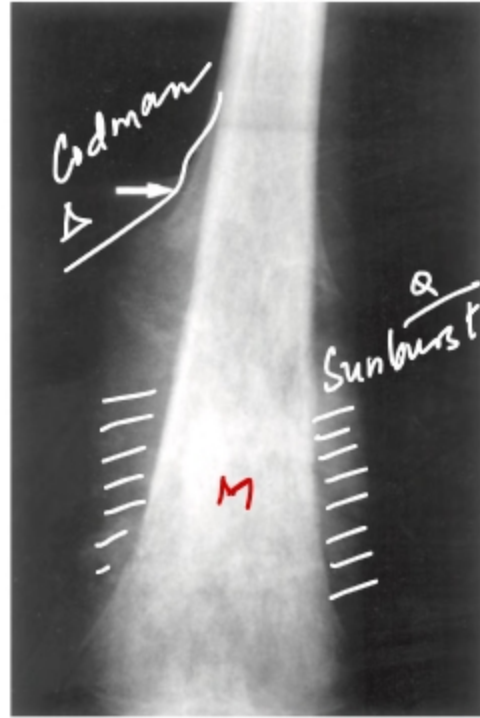
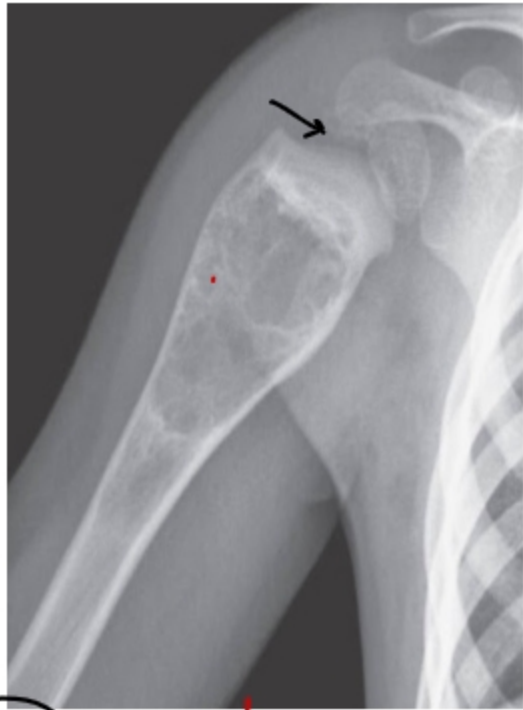
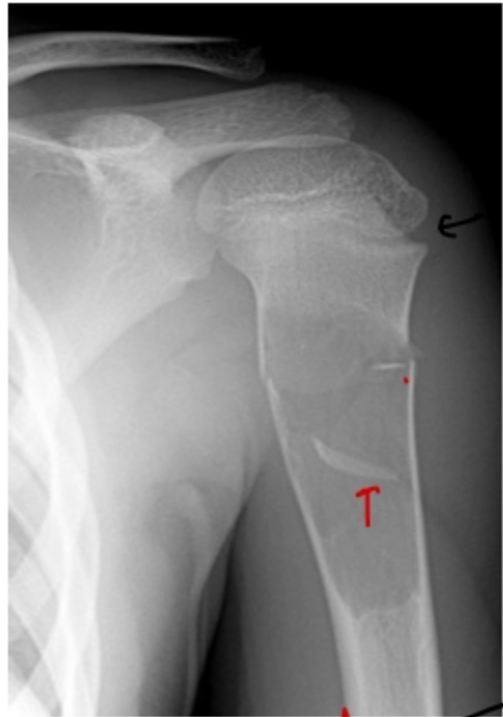
- A. Giant cell tumour ✗
- B. Osteoblastoma ✗✗
- C. Aneurysmal bone cyst
- D. Osteoid osteoma ✗✗



child

M

Metaphyseal tumors



SBC / CHILD

ABC

osteosarcoma

Parosteal
OC

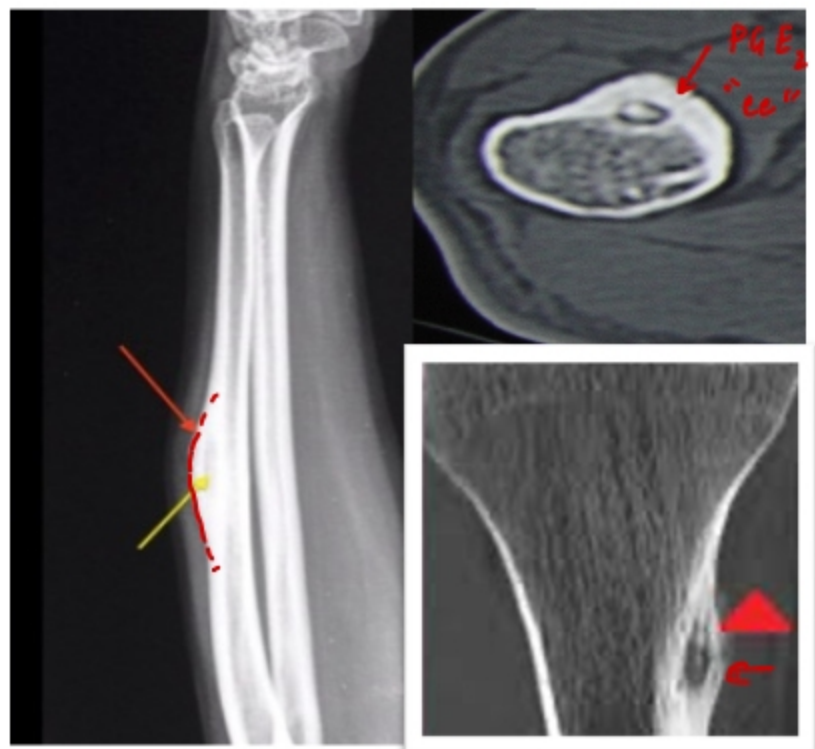
SCH #

- unicameral
- pathological #
- fallen leaf sign / trap door sign

- mc malignant BT
- RB / p53 / Paget's / RT

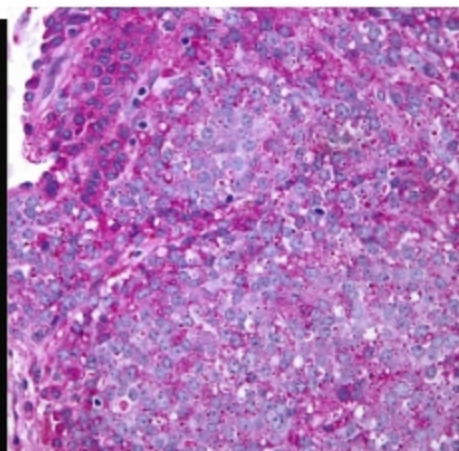
- massage
- metaplasia muscle → bone
- Myositis ossificans mc - brachialis

Diaphyseal tumors



Osteoid osteoma

- Cortical based
- IOC: NCCT
- Pain "nocturnal" relieved on NSAIDs
- Rx: RFA of nidus



Small round blue cell

EWING SARCOMA

- mimic "inflam" - fever, redness, ESR ↑
- $\pm (11;22)$
 - ↳ CD 99
 - ↳ mic 2



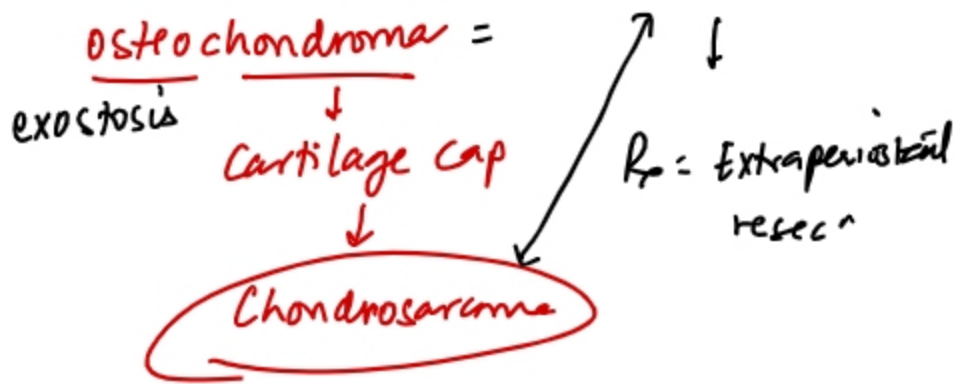
- tibia

- Adamantinoma

Miscellaneous



IOC-MRI
>1.5cm
thickness

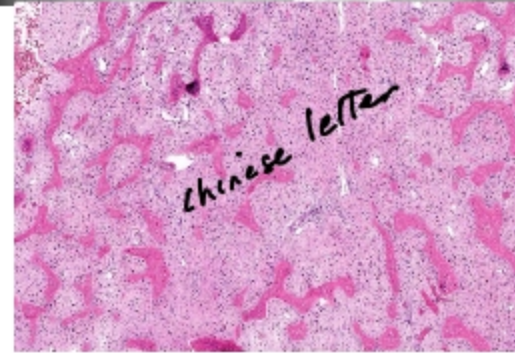


ENCHONROMA

Ollier's Sx

Hemangiomas

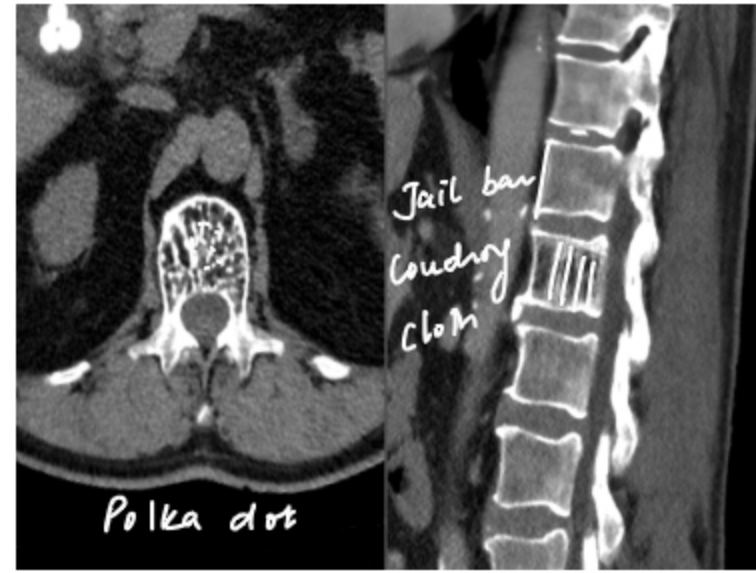
Maffucci Sx



Shepherd Crook =



Miscellaneous



- elderly
- Pelvis / Scapula
'ring & arc' Ca²⁺
Chondrosarcoma

osteoblastoma
- vertebra (me)

Intracalcaneal
lipoma

mc benign spine
,
Hemangioma

MANAGEMENT

OSTEOSARCOMA
CHONDROSARCOMA

↓
 $S_x \pm \underline{NACT}$
=

EWING SARCOMA

↓
CT-RT

CAGE FD
CHONDROBLASTOMA
ABC
GCT
ENCHONDROMA
FD

} → extended curettage

SBC

→ simple curettage

OSTEOCHONDROMA

→ resection

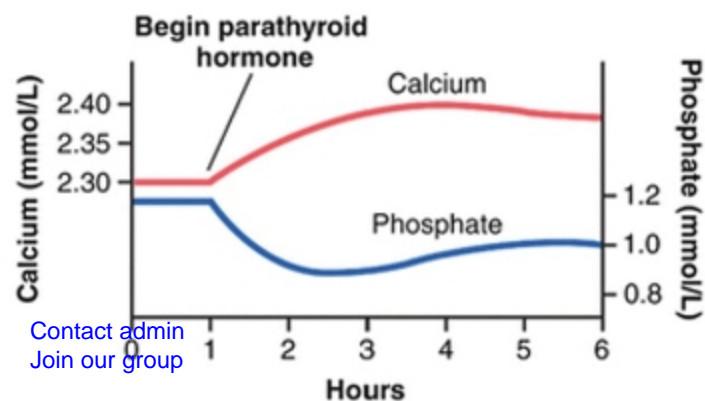
OSTEOID OSTEOMA

→ RFA

Metabolic bone diseases

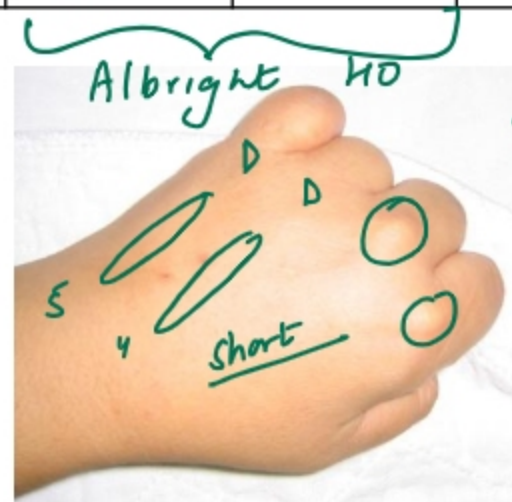
maternal
paternal
GNAS

	Rickets Osteomalacia <i>vit D ↓</i>	1 HPT <i>PTH adenoma</i>	2 HPT <i>CKD</i>	Hypercalcemia of malignancy <i>sqcc PTHrp</i>	Sarcoidosis <i>lym ↑ vit D ↑</i>	Hypo PTH <i>(AI) / iatrog</i>	Pseudo- hypoPTH <i>End organ r</i>	Pseudo- pseudo- hypoPTH	Paget's	Osteoporosis
Calcium 8.5-10.5 mg/dl	↓	↑	↓ <i>lym (-)</i>	↑	↑	↓	↓	(N)	(N)	(N)
Phosphate 2.5-5 mg/dl	↓	↓	↑ <i>qq</i>	↓	↑	↑	↑	(N)	(N)	(N)
PTH	↑	↑↑	↑	(N)	↓	↓	↑	(N)	(N)	(N)
ALP	↑	↑	↑	↑	(N)	(N)	(N)	(N)	↑	(N)



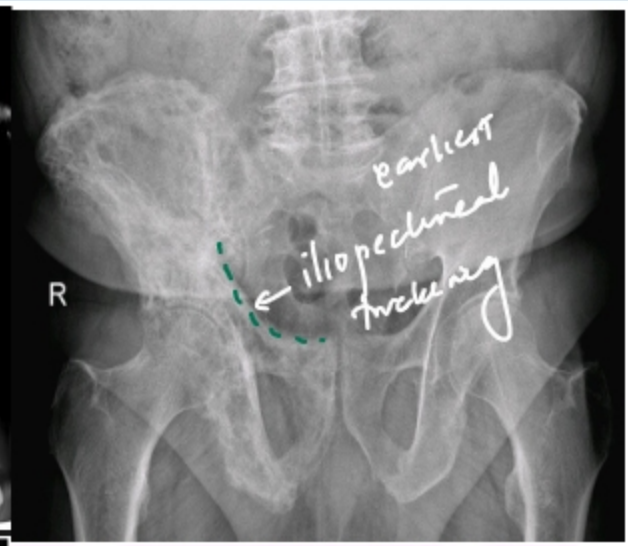
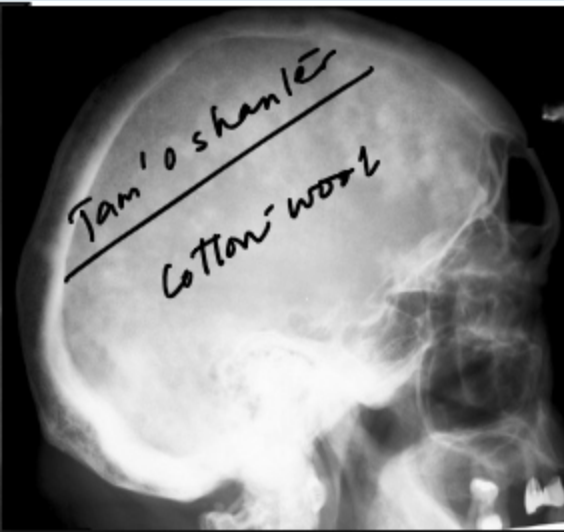
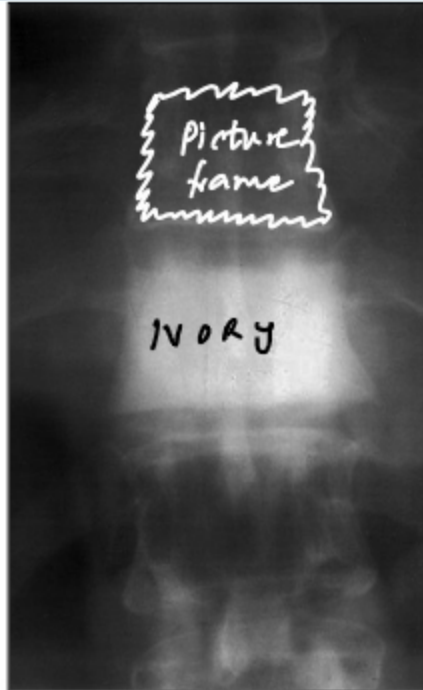
↑ vit D → ↑ Ca ↑ PO₄

↑ PTH → ↓ Ca ↓ PO₄
bone resorp
↳ ↑ ALP



Turner's :
4th mc short

METABOLIC BONE DISEASES



postmenopausal elderly ♀
 ↓↓ BMD

osteoporosis

IOC: BMD → DEXA scan
 dual energy x-ray absorptiometry
 Quantitative USG / CT
 WHO: -1 to -2.5SD : osteopenia
 <-2.5SD : osteoporosis

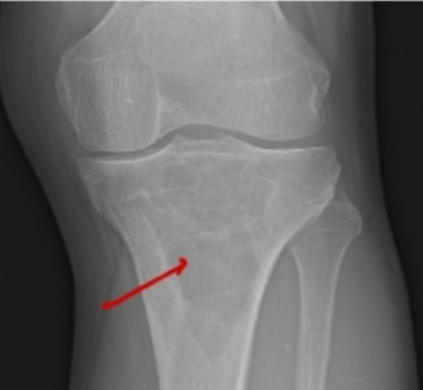
T-score (young adult)
 Z-score (age-matched)
 contact admin
 Join our group

FRAX

PAGET'S
 o'clast xx
 Lytic / mixed / blastic

pathological #
 2° OS
 HOCP
 • elderly
 • 1st → Pelvic

METABOLIC BONE DISEASES



O'clast CI channel xx
Osteopetrosis → child
 ↳ marble bone D

Pancytopenia + HSM

BROWN TUMORS

Hallmark: Subperiosteal Resorption - phalanges ↑ radial side

osteitis
 cystica
 fibrosa

HyperPTH

Most severe:
 type 2 -
 in wk20

AD OI
 xx Coll I defect
 - multiple # vs NAI
 OI ↓
 diaphyseal

Osteoporosis treatment

Inhibit Osteoclasts

- Doc - o'porosis / Pagete

BISPHOSPHONATES: Farnesyl pyrophosphate synthase -

Adverse effect-

1. Esophagitis
2. osteonecrosis mandible
3. atypical femur $\#$ (5-7yrs) \rightarrow 'Drug holiday' *3yrs*

Longest acting- Zoledronate
(iv infusion - 1yr) *slc-renal F*

Alendronate/Risedronate: ORAL

SERM : Raloxifene (slc: DVT)

Denosumab

RANK L \ominus
o'blast

RANK
o'clast

Calcitonin: Intranasal

Cinacalcet-CasR agonist

Used in HyperPTH

Stimulate Osteoblasts

PTH 1-34 / intermittent PTH

Teriparatide

Abaloparatide

Max: 2yrs \rightarrow *R/O o'sarcoma*

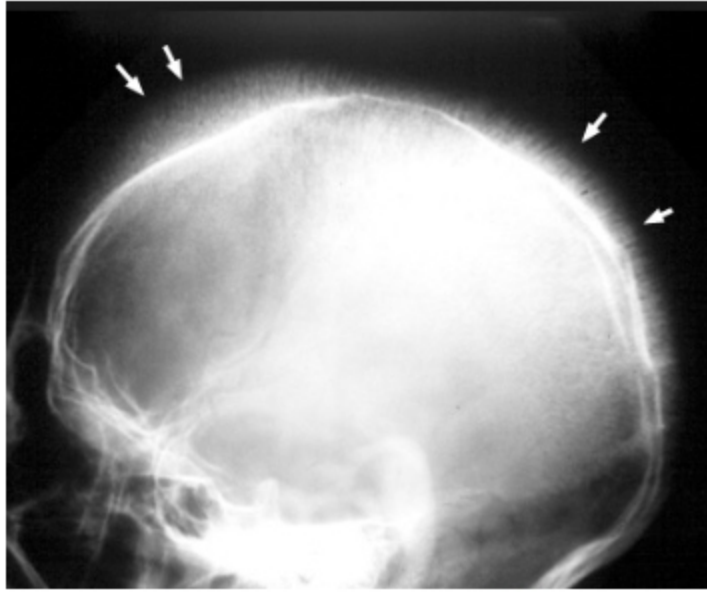
Dual Action

or
Romosozumab

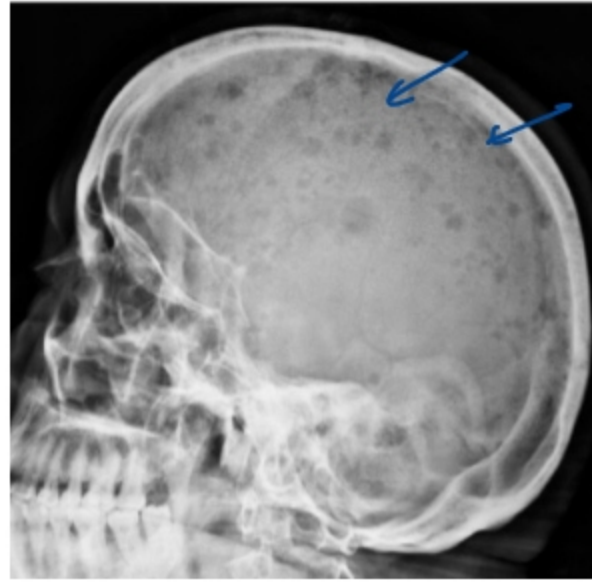
sclerostin \ominus

Strontium

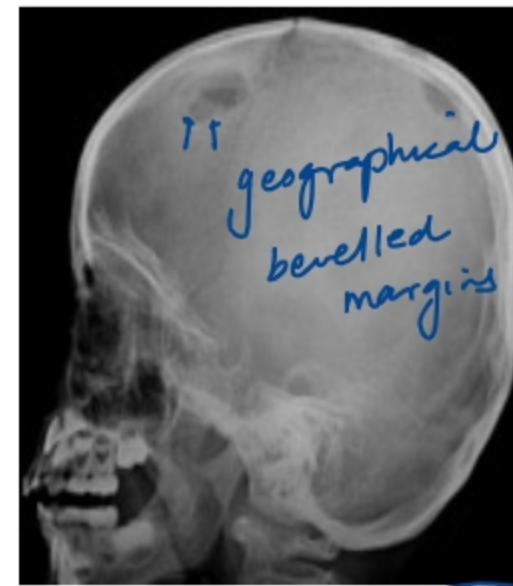
SKULL XRAYS-PATTERN APPROACH



Hair on end
 ↓
 Hemolytic anemia
 Malaria / SCA



Punched out /
 Rain drop
 ↓ ↓
 Lytic mets MM



75
 geographical
 bevelled
 margins



vertebra
 plana

- skull L
- DI
- proptosis

CHILD

LCH

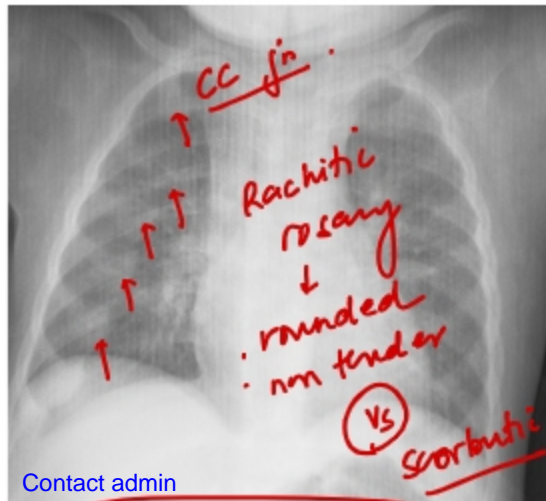
CD 207 / S-100 / CD 1a (+)

APPROACH TO SHORT STATURE

5yr old low SES, low bone density



SCURVY vit C ↓
collagen (x)

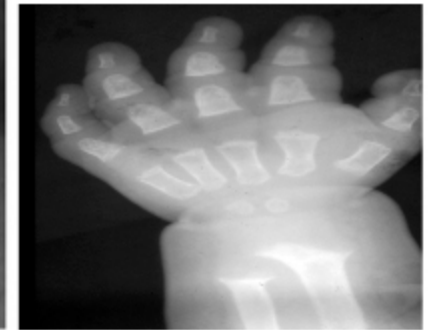
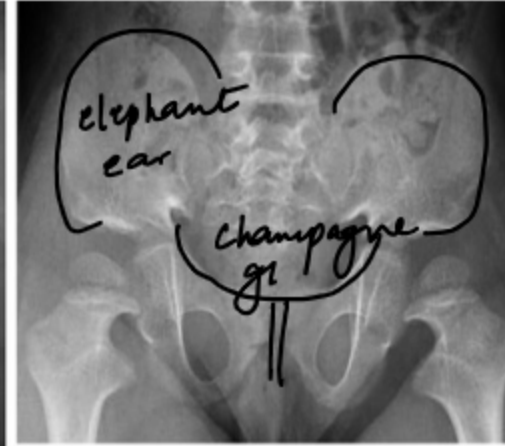


Zone of provisional
cartilage ↓↓
growth plate
widening
earliest

Contact admin
Join our group

RICKETS

5yr old short stature, normal bone density



Rhizomelic

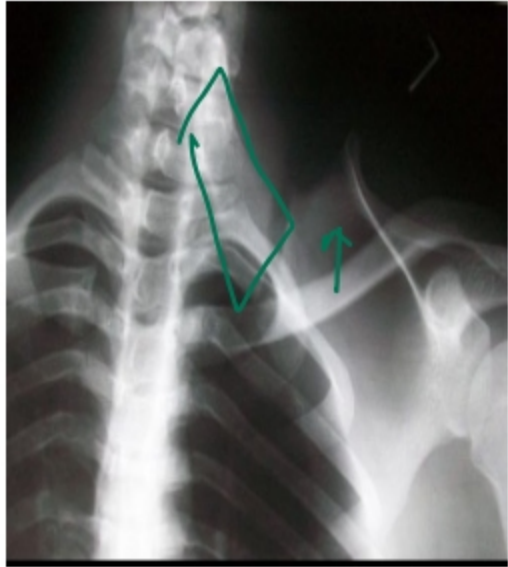
↳ Achondroplasia - FGFR3 (chr 4)

Bulge post scalloping

PEDIATRIC PATHOLOGIES



- Block vertebra
 - Short neck
 - Low hairline
- KLIPPEL-FEIL Sx

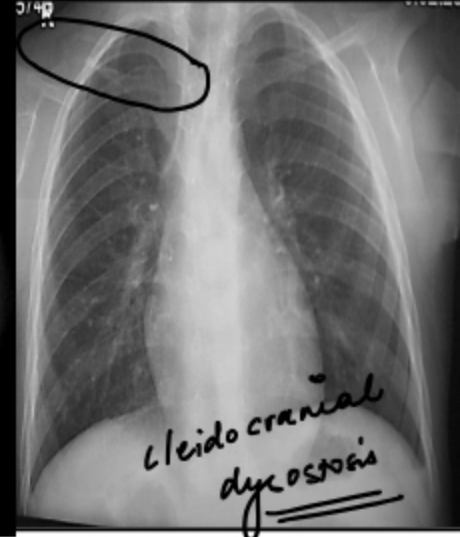


Sprengel's deformity

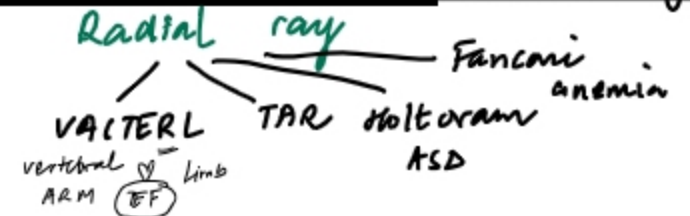
Nail-patella Sx



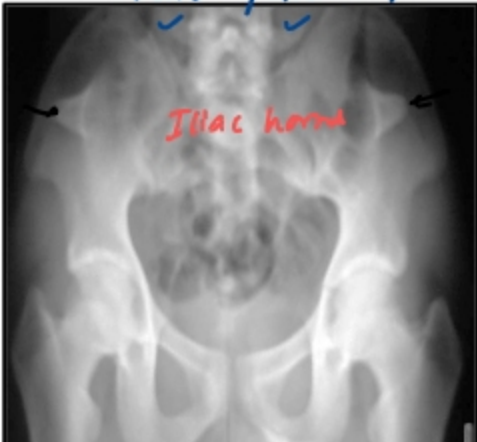
Cong torticollis
↳ birth trauma



Kleido cranial dysostosis



Contact admin
Join our group



Iliac horns



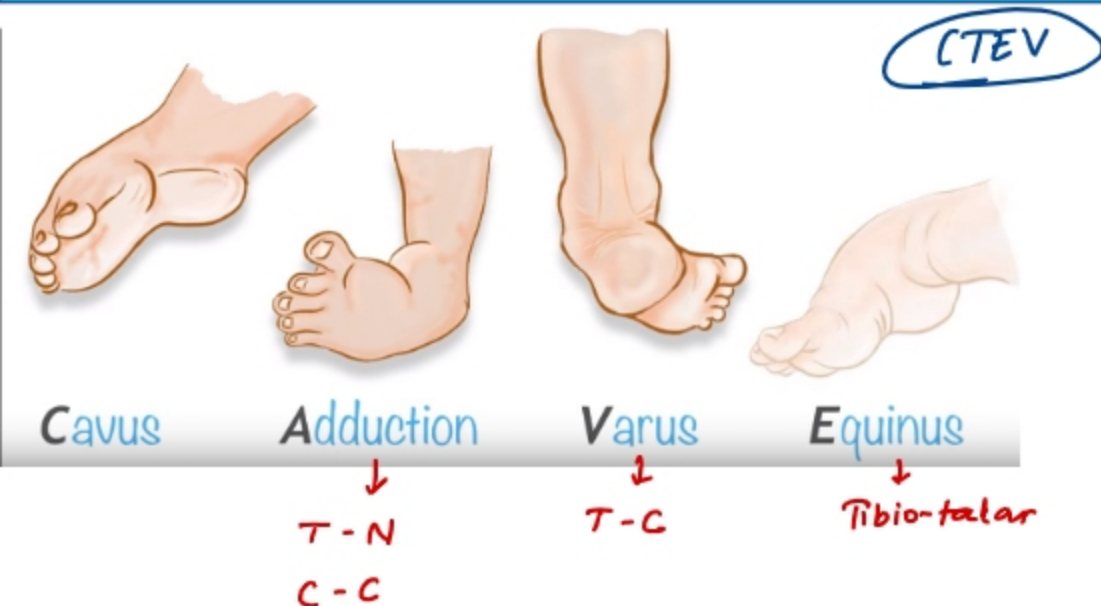
Genu valgus
mcc: Alkelt's
Blount's discum



Modified Insall-Salvati index
[mean norm = 1.2]

Patella alta - High
baja - Low

PEDIATRIC PATHOLOGIES



screening : densiflex
↓
shin (N)



tibial pseudoarthrosis
L NF1

• Kite L

	Kites method	Ponseti method now preferred
At birth	Manipulation by mother	Manipulation and cast
Change of cast	Every 2 weeks	Weekly
Correction order	C-A-V-E	C-AV-E
Fulcrum	Calcaneocuboid joint	Head of talus
Duration	6 - 9 months	6 - 8 weeks



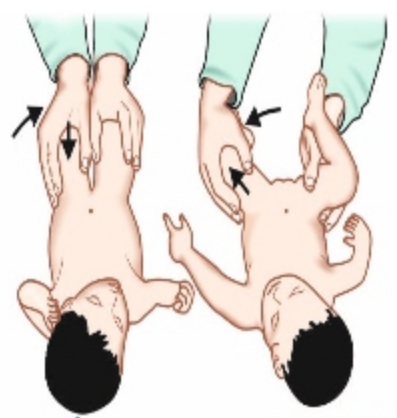
Dennis - Brown shoes

neglected CTEV

Age	Management
1-3 years	Posteromedial soft tissue release (PMSTR) ^{Turco's}
3-5 years	Dillwyn Evans procedure
5-8 years	Dwyer osteotomy
8-10 years	Wedge tarsectomy
>10 years	Triple arthrodesis, external fixators JESS → Joshi's → T-N, C-C, T-C

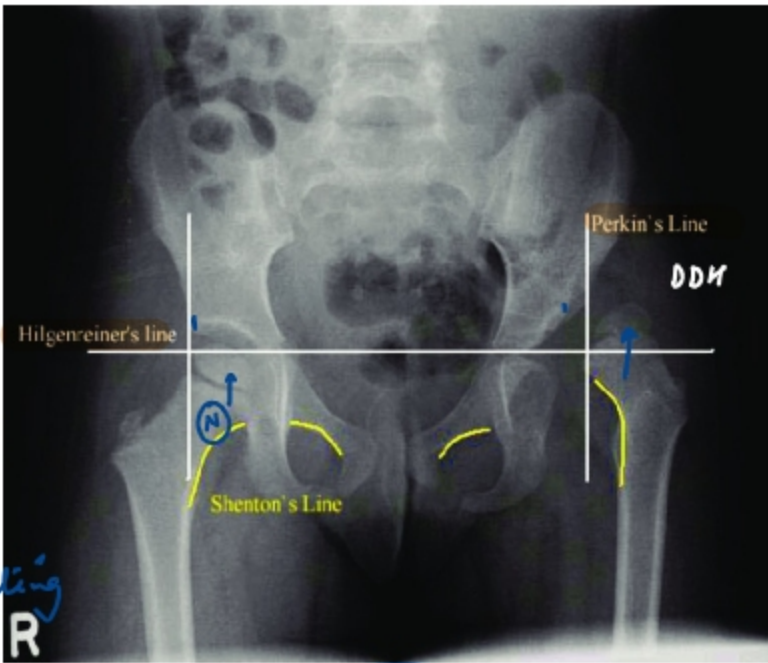
Pediatric Hip pathologies

• ABIR ↓ Hip • pain radiating to knee



Barlow
'BAD'
addⁿ → dislocating

Ortolani
abdⁿ
↳ relocating



DDH

0-5yo

♀ ↑↑



Perthes' ✓

5-10yrs

♂ → ↑



SCFE

10-15yrs
obese

♂ → ↑

type 1 SH



asymmetric

• asymmetry - Galeazzi / Allis'
• telescoping ⊕
Contact admin
Join our group

Graf classification

Alpha angle: ↓ in DDH

Beta angle: ↑



< 6mon: USG

1st Ix

> 6mon: Xray

von Rosen splint

Age	Management
< 6 months	Closed reduction with Pavlik harness or von Rosen splint
6-18 months	Closed or open reduction followed by hip spica Smith Peterson approach
18mon-10yrs	Femoral osteotomy (Salter's, Pemberton, Steel) +/- shortening of femur
>10yrs	Total hip replacement

INSTRUMENTS



bone nibbler



bone cutter



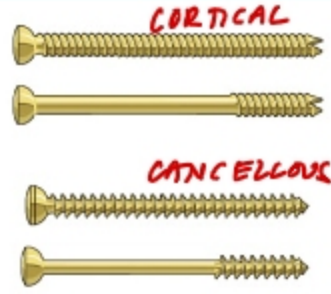
osteotome



periosteal elevator



bone holding forceps



CORTICAL

CANCELLOUS



K-wire

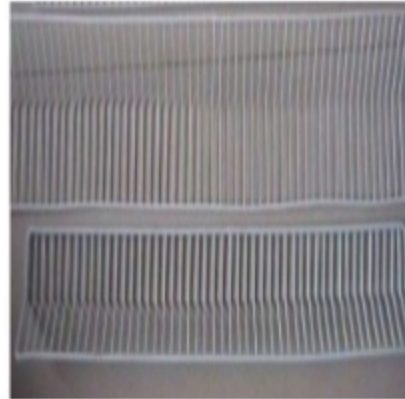


Steinmann pin

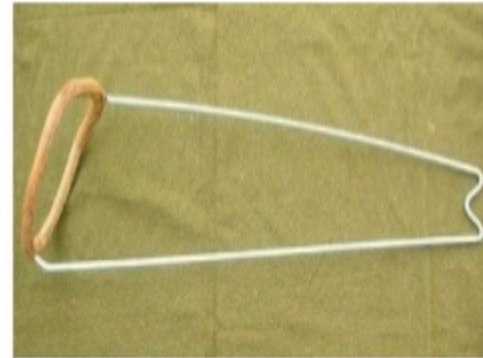


Denham pin
groove

Skeletal traction ~ 20 kg
Skin " ~ 4 kg



Kramer's splint
- emergency

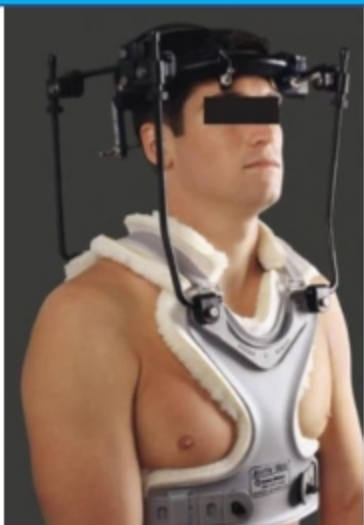


Thomas splint
↓
Shaft of femur #



B-B splint

SPLINTS AND TRACTIONS



Halo's rest



4 post collar
C-spine



SOMI brace



ASHE



TAYLOR



turn-buckle splint
VIC
↓x
Maxpage operation



Valpan : ACL disrup
Contact admin
Join our group



Crutchfield tongs



Jaipur foot - ↑ mobility / flexion / squatting



SACH foot

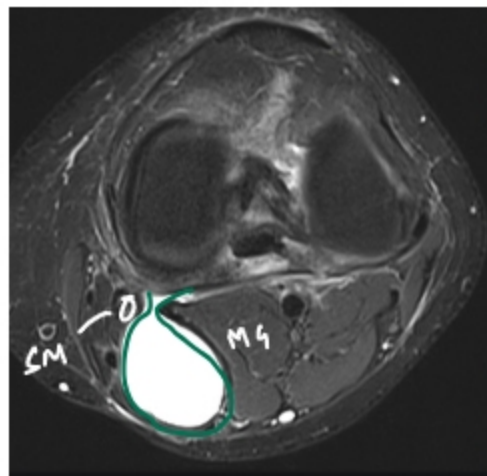
Miscellaneous

BONE FORMATION:

- ALP
- Osteocalcin
- Osteonectin

BONE RESORPTION:

- Hydroxyproline
- Hydroxylysine
- Deoxypridinoline
- TRAP - osteoporosis
- Telopeptide



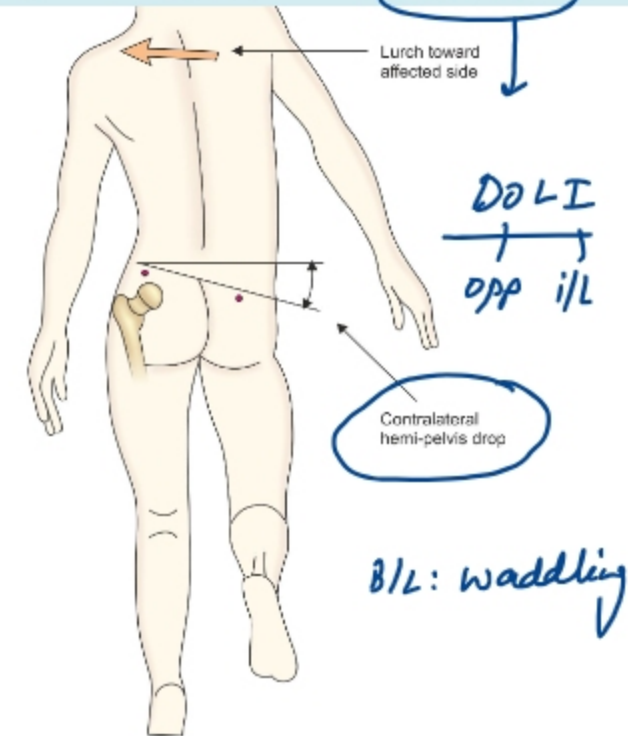
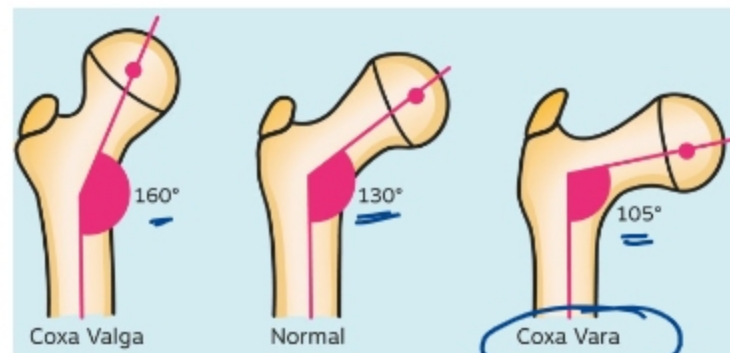
Baker's cyst



Popeye sign:
Rupture of proximal head of biceps




below-knee amput"



DOLI
+
opp i/L

TREDELENBURG GAIT



No man's land in flexor tendon Sx: 2me 2
 PAIN ON PASSIVE STRETCH: most sp → Compartment Sx
 Muscle mc: FDP - skin / subcut F / sup F / deep F (long incisions)
 Indication of fasciotomy: Compartment > 30mm or
 Petechiae, dyspnea, confusion: FAT EMBOLISM
 Patellar clunk syndrome: femoral comp - extensions
 Order of replant of an amputated finger: BEVAN (bone, extensor) FAN (flexor)
 Pedicle screws 
 Articular pain: Passive + active - pain
 Non-articular pain: Only active - pain

Contact admin
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