

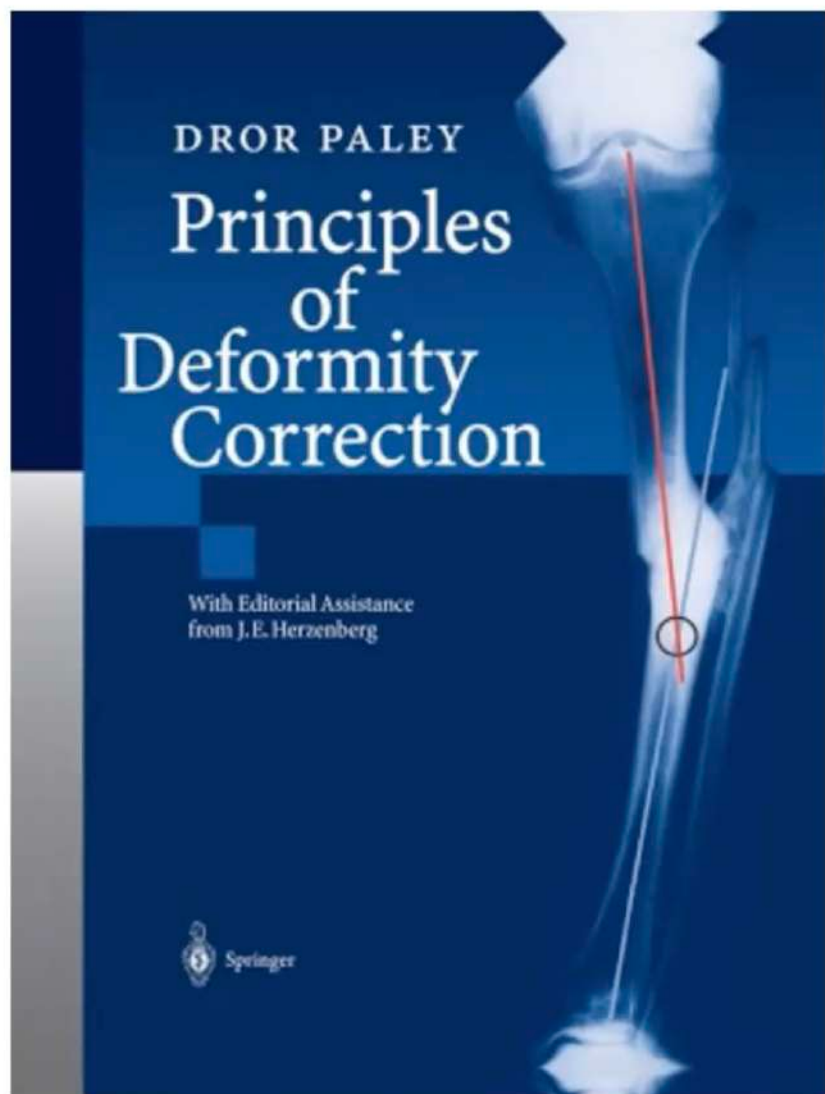
Deformity Correction

DR ANURAG TIWARI

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Assistant Professor, Gandhi Medical College, Bhopal



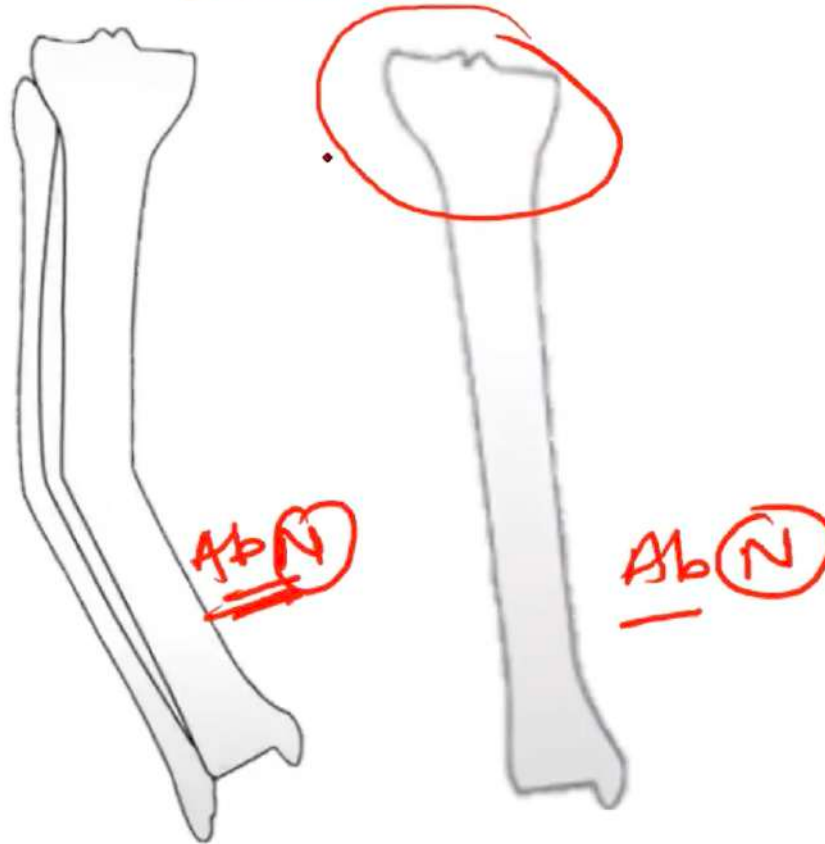
DROR PALEY



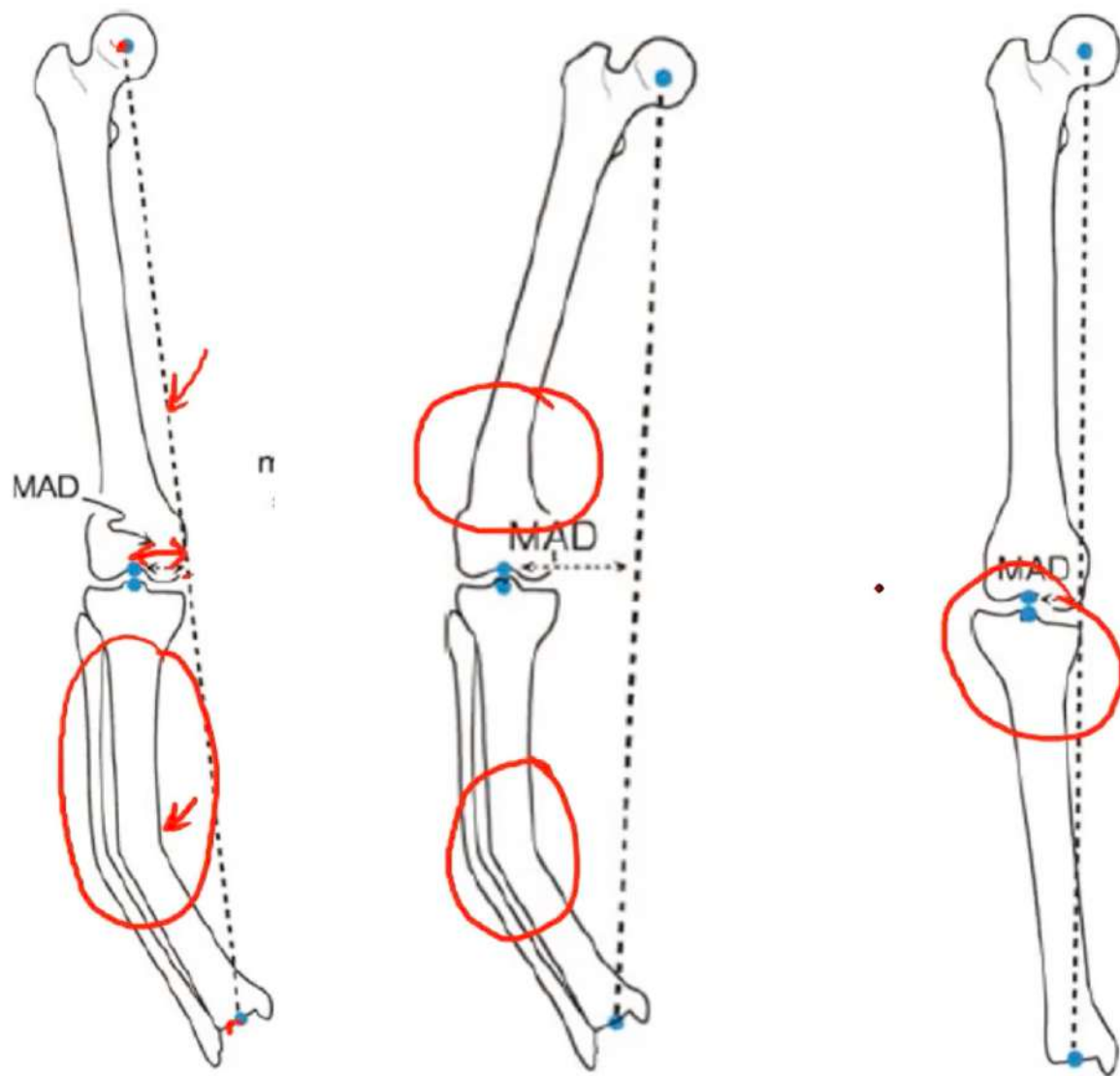
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What so special?

- Defined what is “normal” and what is “abnormal” ?
- Standard Nomenclature
- Standard Measurements



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All are false statements except?

- A. Mechanical axis is always straight *→ It centres. True -*
- B. Anatomical axis is always straight *→ Frontal / Sag. femur Sagittal -*
- C. Mechanical axis is only drawn in frontal plane *True -*
- D. All are false *→ Mid Diaphyseal -*

- Tibial mechanical axis in frontal plane is –
- A. Medial to anatomical axis
- B. Same as anatomical axis
- ✓✓ • C. Lateral to anatomical axis
- D. None of the above

- Deformity ??
- When the limb or joint cannot be brought to its normal anatomical position.
- Translational
- Angulation
- Rotational
- Limb length Discrepancy (LLD)

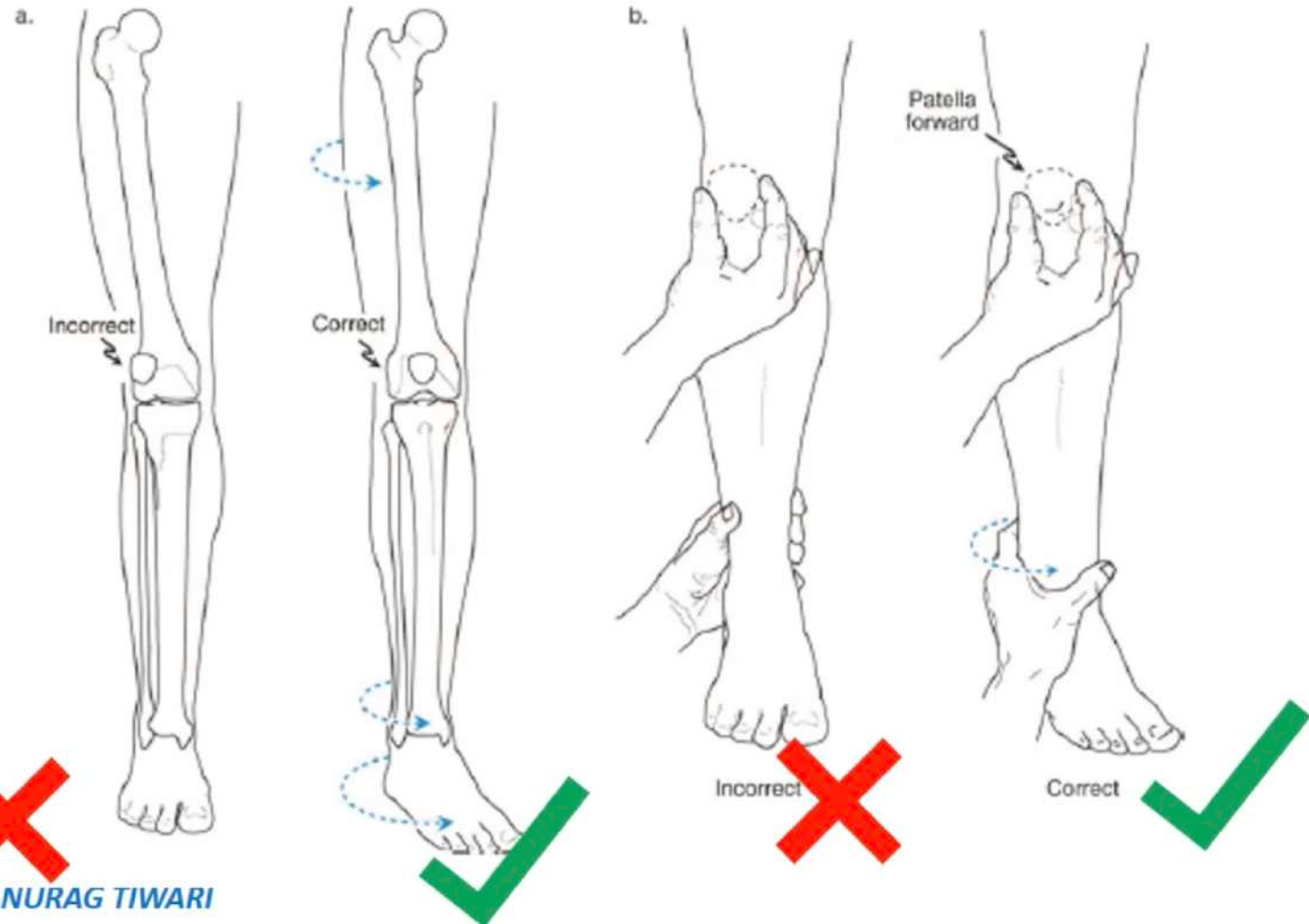
Xray evaluation – Preoperative planning

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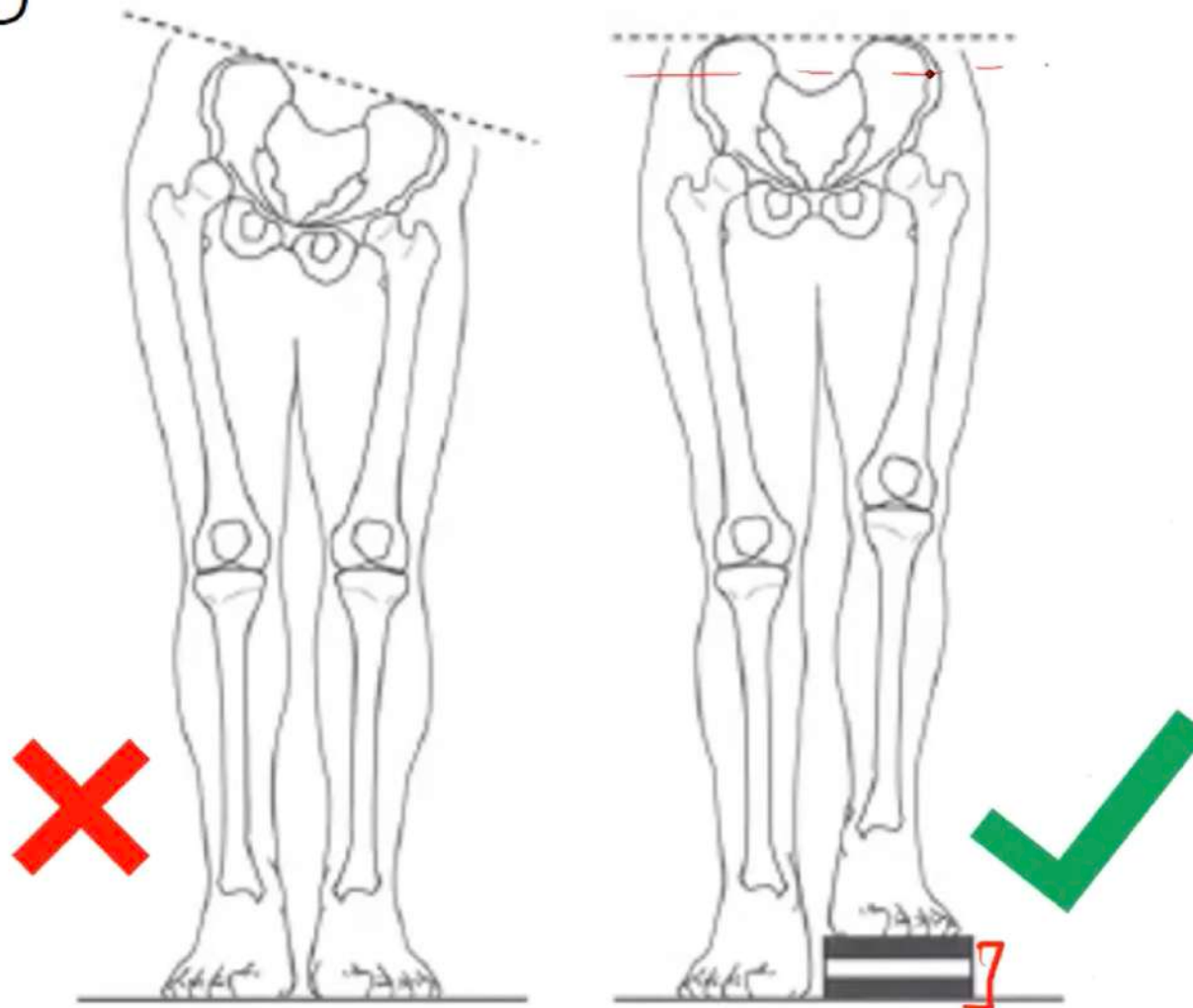
Position of limb while getting Xray

- Patella forward



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In case of LLD



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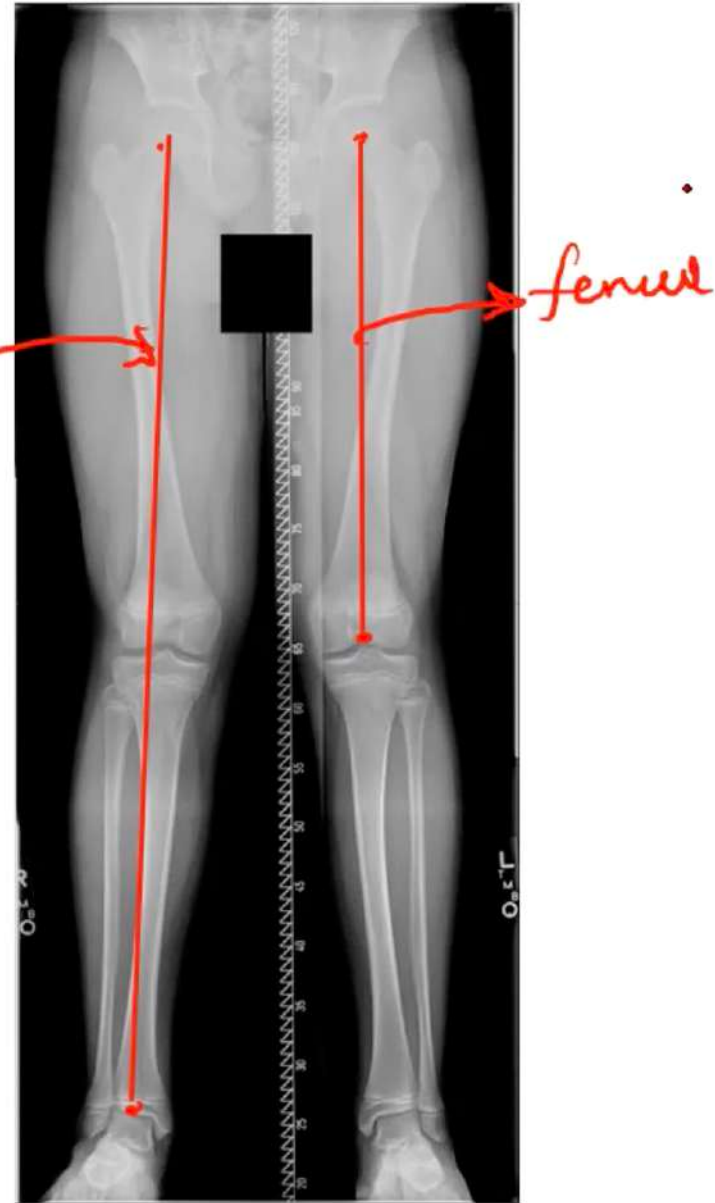
Definition

- Axis
- Joint orientation line
- Joint Orientation angles

Axes-

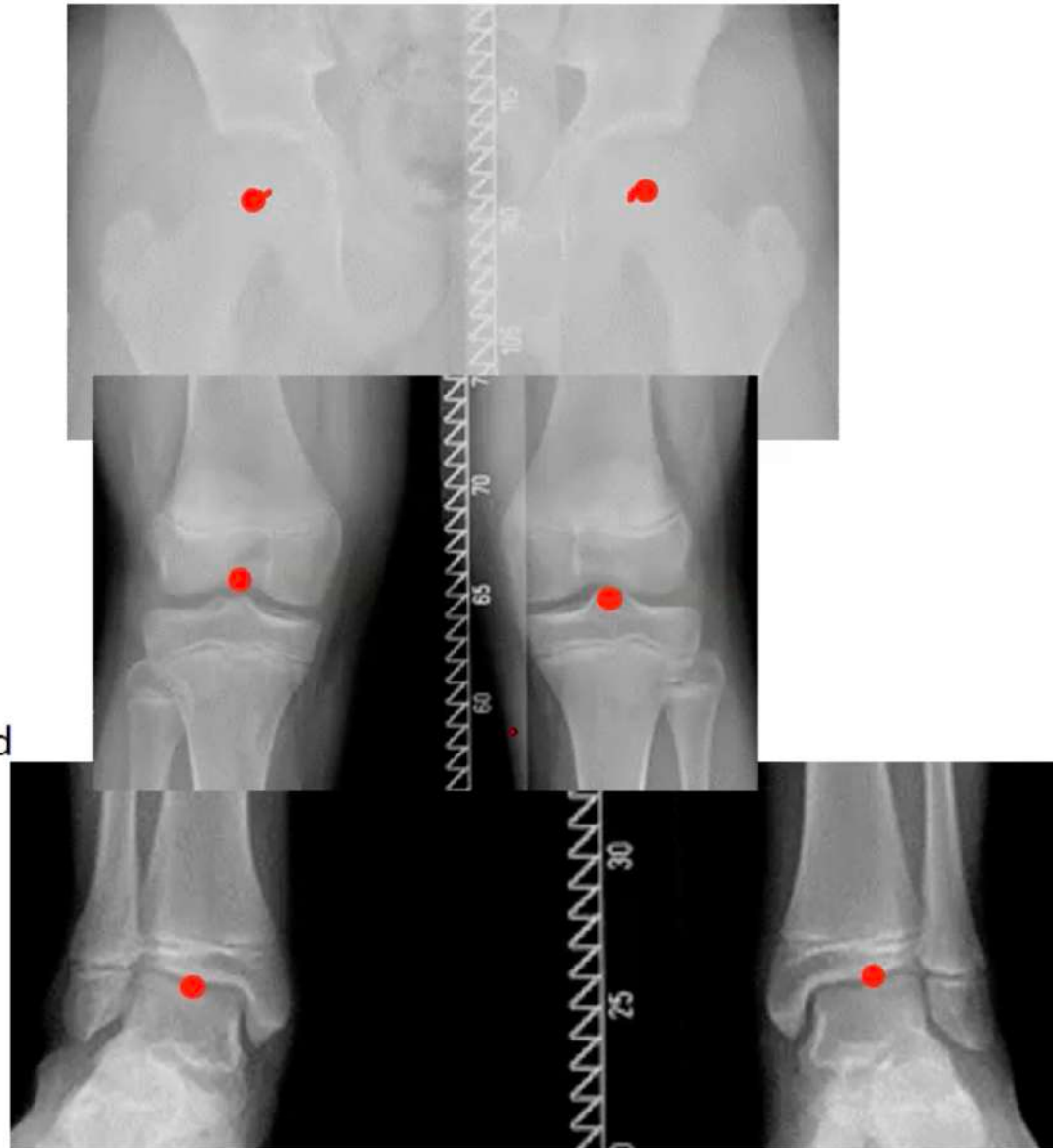
- Mechanical axis- *Bone*
entire limb → Connecting proximal and distal joint centres
Always straight- in any plane

- Anatomical axis-
Mid diaphyseal line of bone
It can be curvilinear

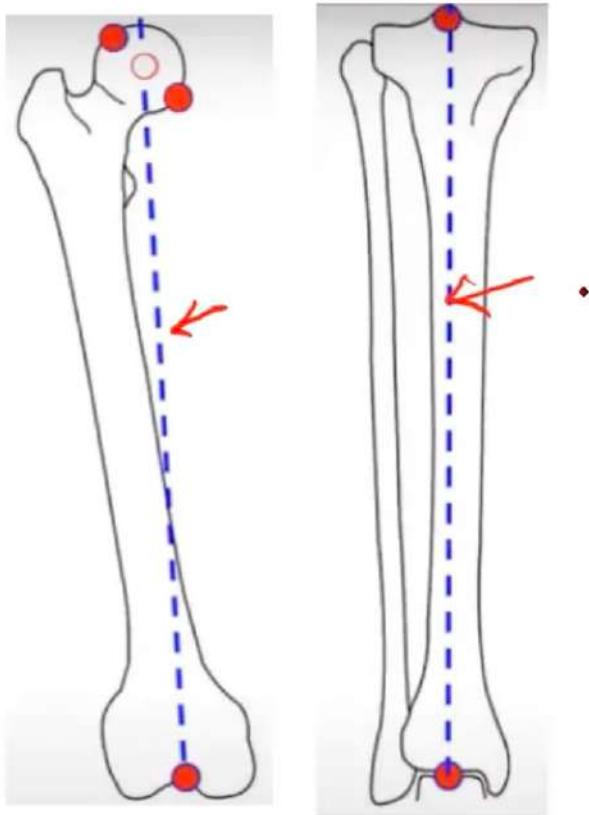


Joint centers

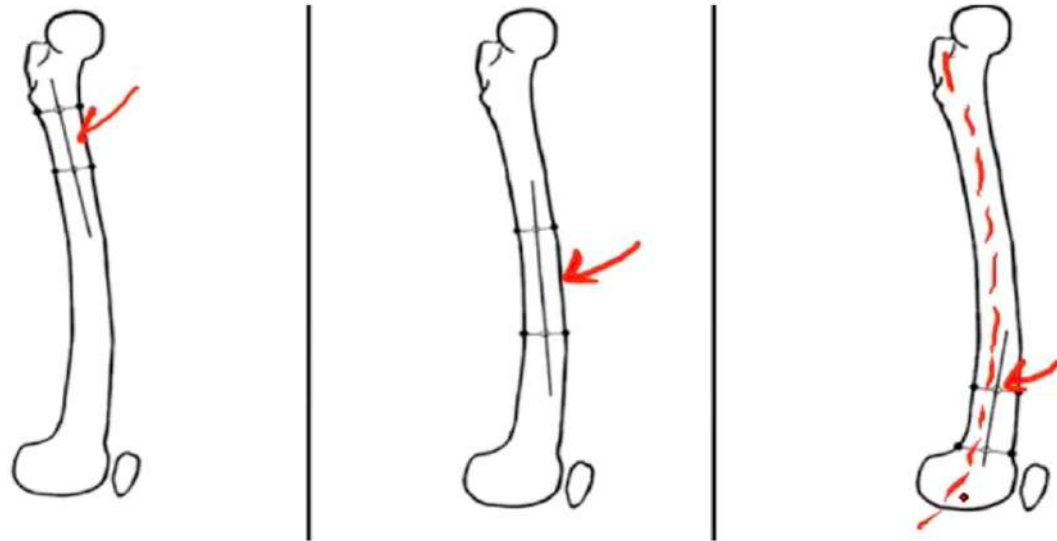
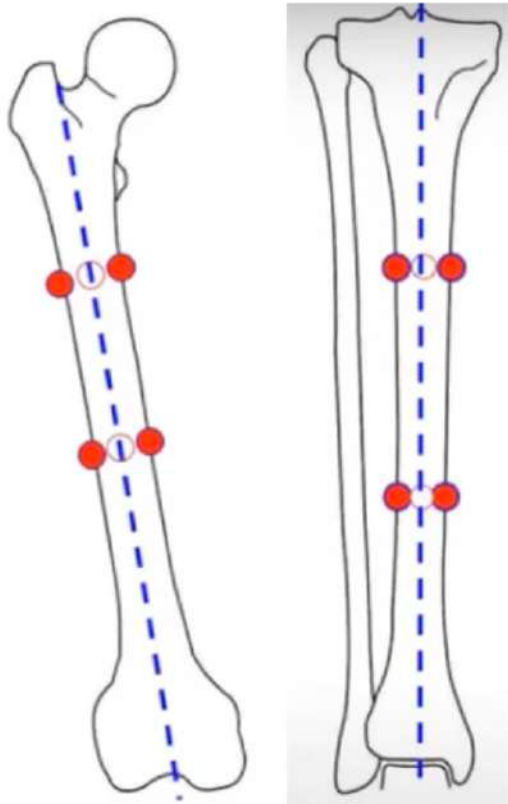
- Hip – Centre of femur head
- Knee –Mid point of femur notch or
Mid point of tibial spines
- Ankle – Centre of talus or
Centre of tibia- fibula at level of plafond



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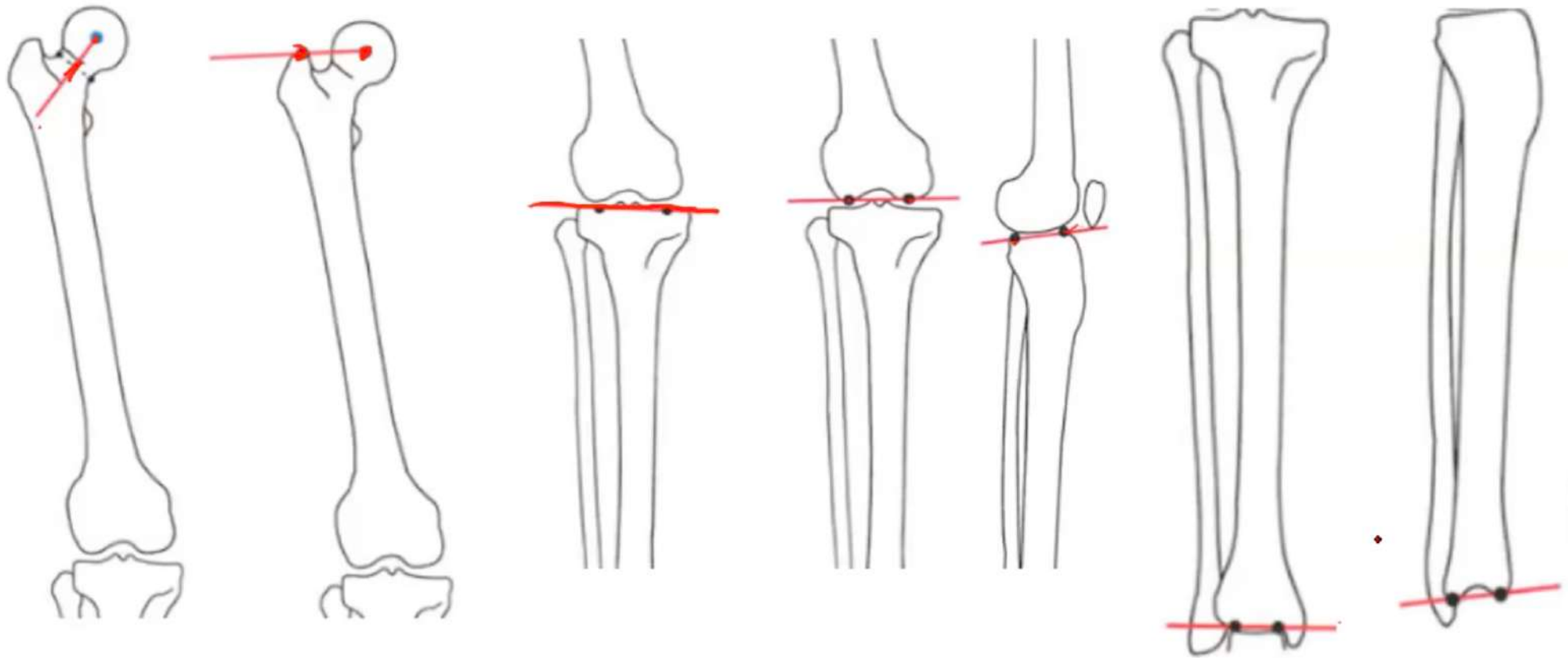


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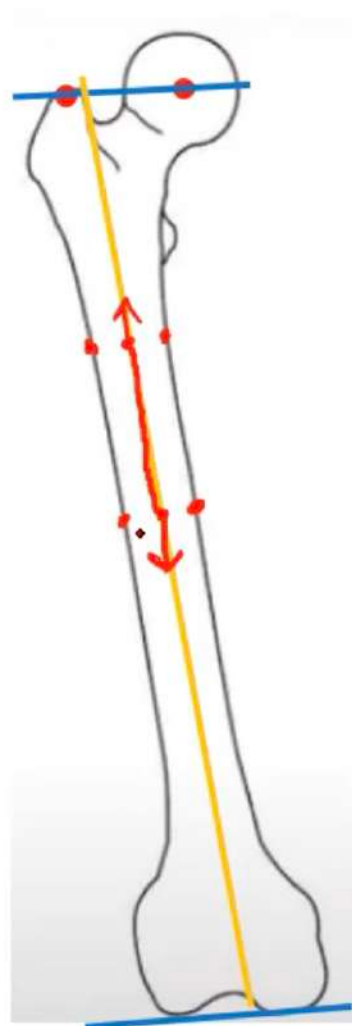
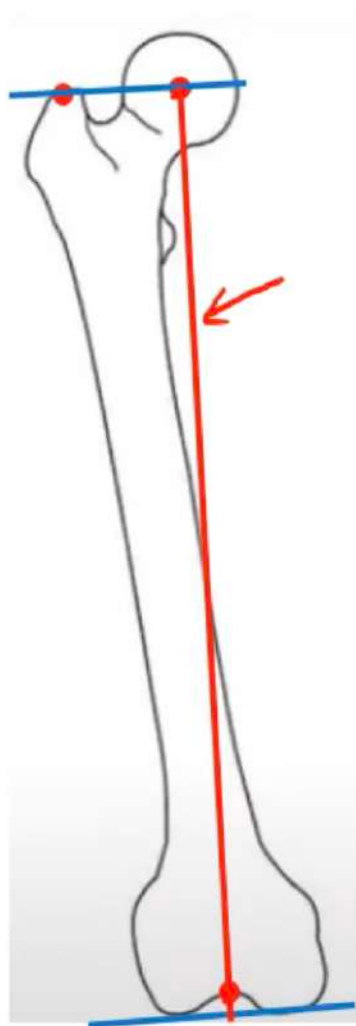


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Joint orientation line

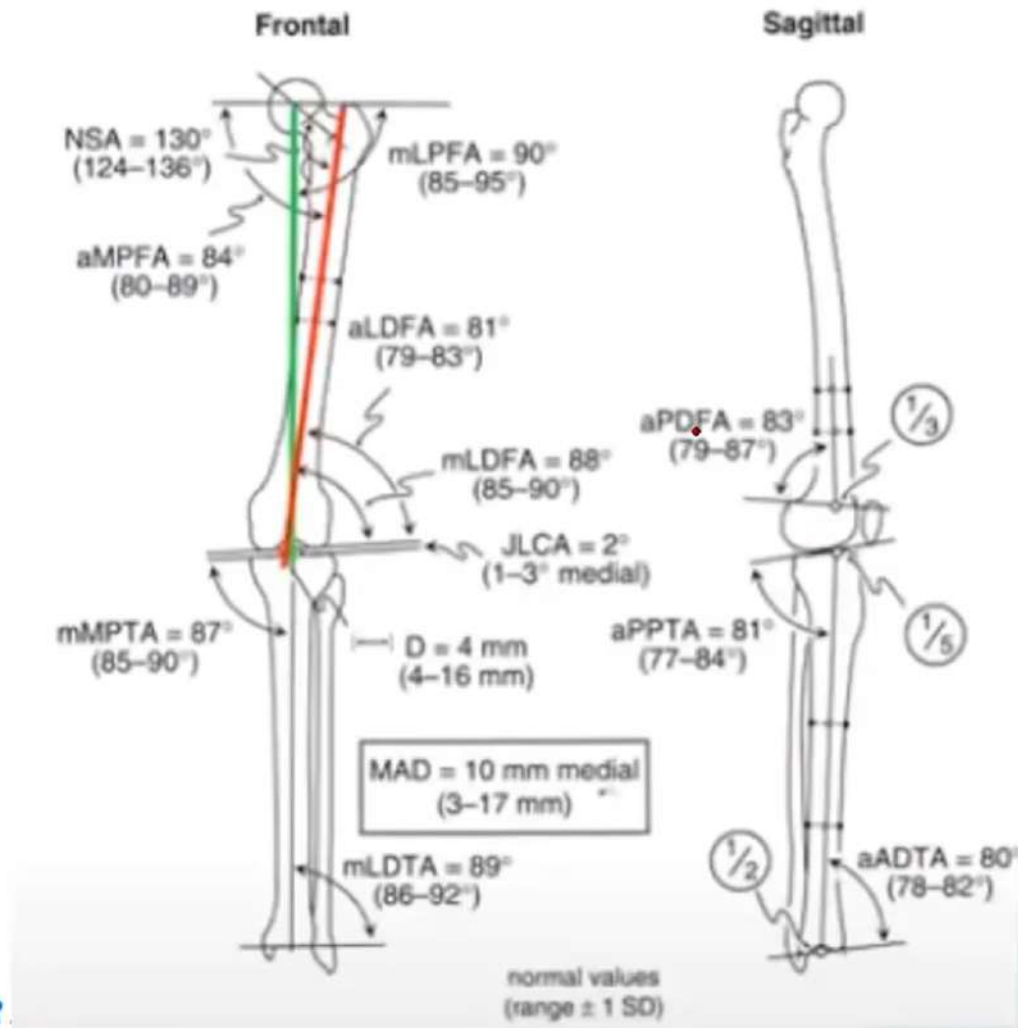


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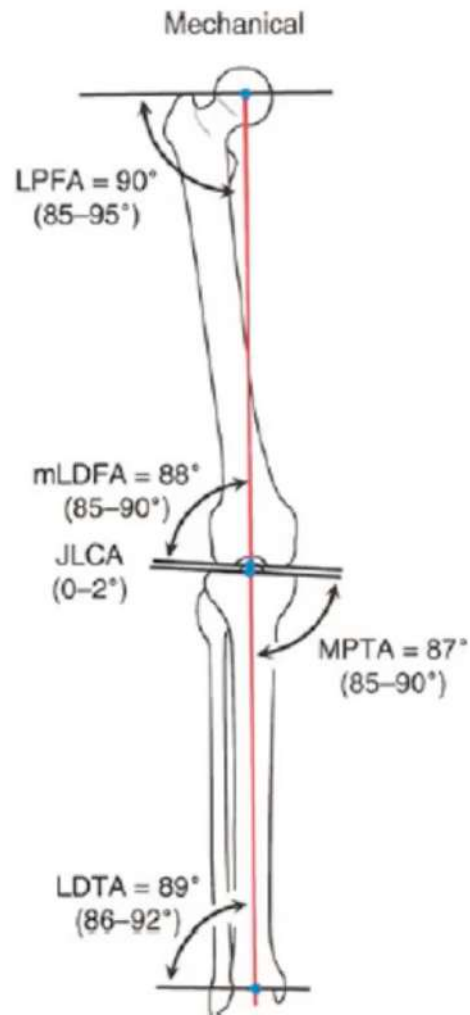
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Joint orientation angle



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Mechanical axis joint angles

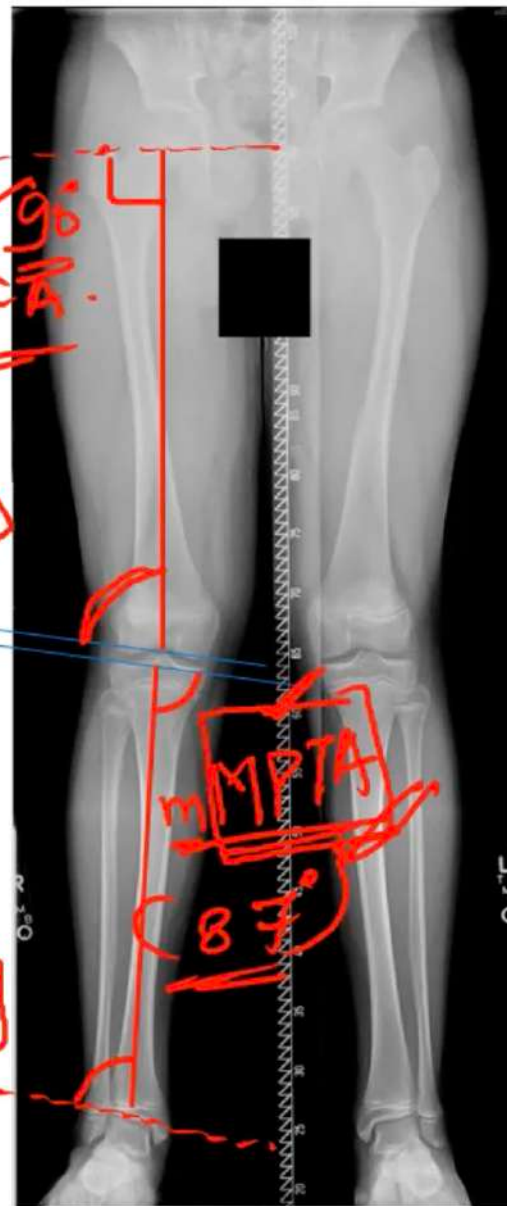


90°

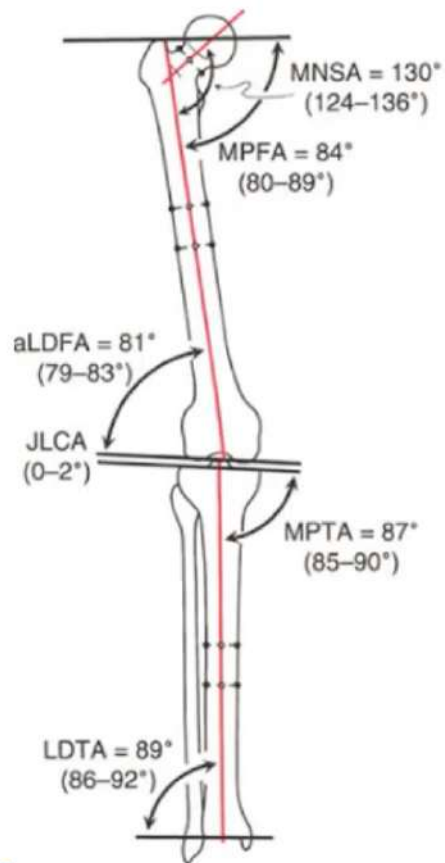
✓ 96°
LPFA

✓ mLDFA
(85-90°)
87

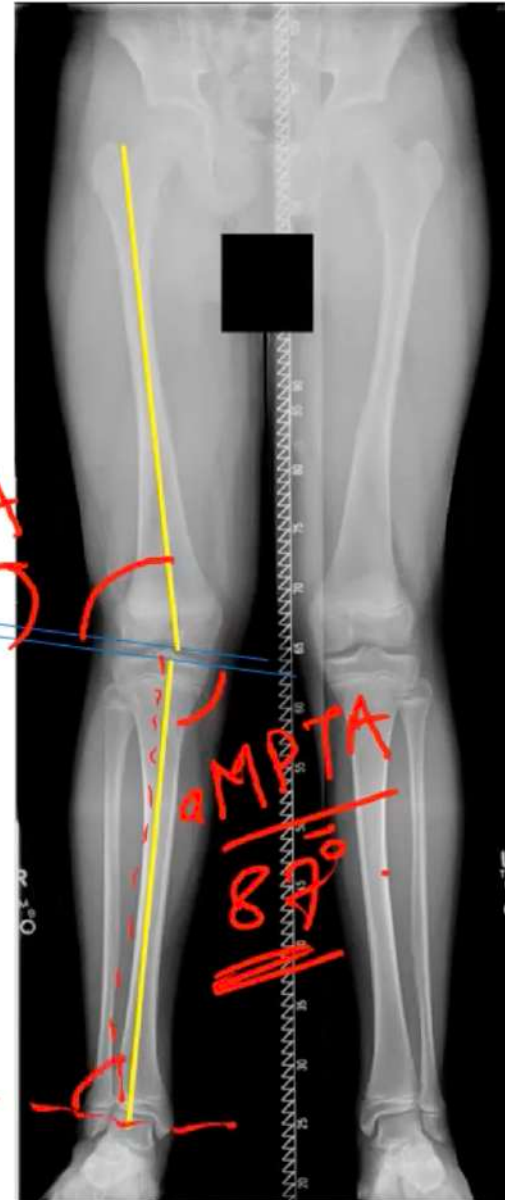
LDTA 89°



Anatomic axis joint angles



81°
aLDFA
(80–83°)





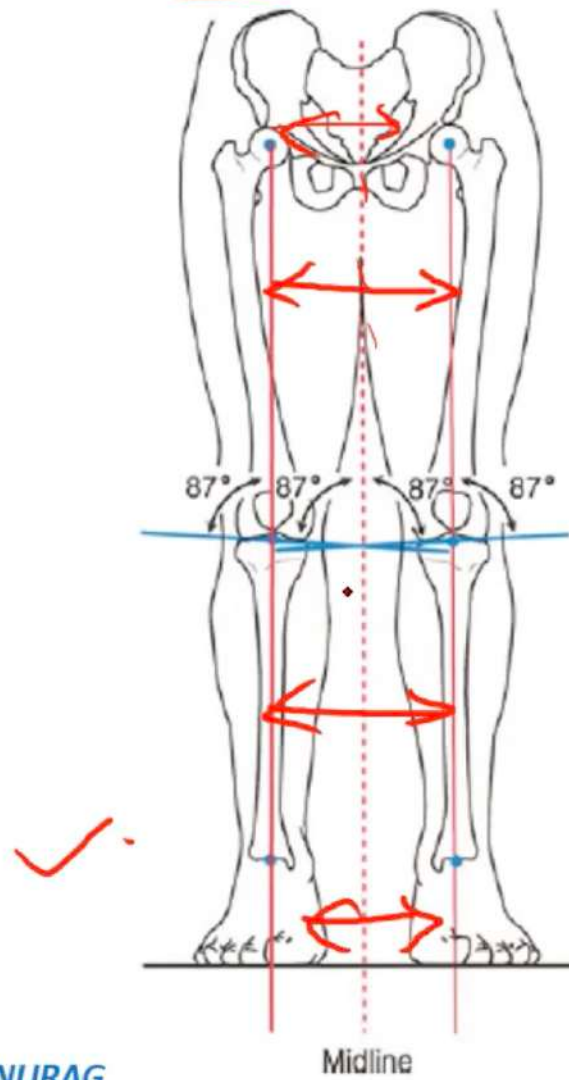
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Mechanical axis deviation (MAD)

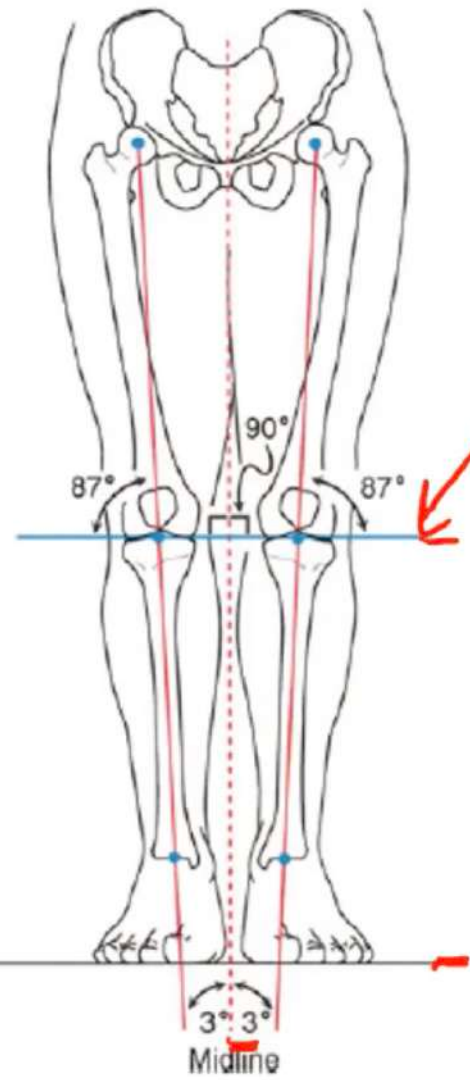
- Joint alignment – (MAD)
collinear relation of hip, knee and ankle
- Normal MAD is 1-15mm medial to knee
(8 +/- 7 mm)
- Joint orientation-
relation of articular surface to axis of bone



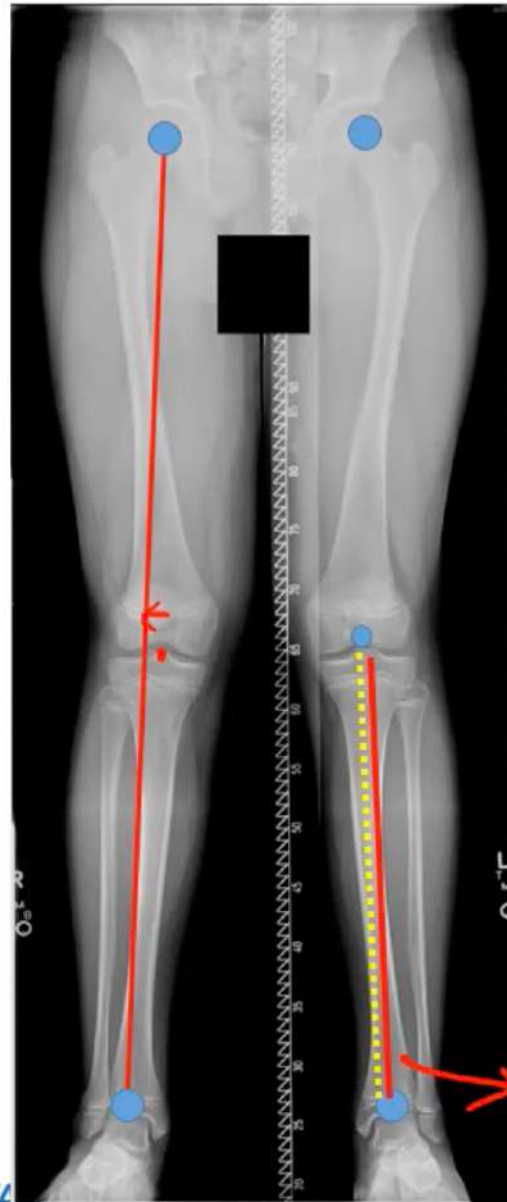
At ease standing position



At attention standing position



Lat. MAB
(valgus)



mech. axis
lateral.

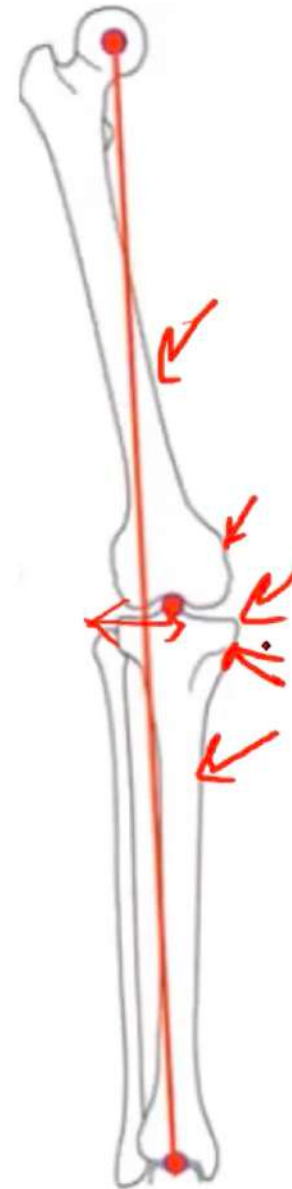
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- Malalignment – If MAD is more than normal
- Malorientation- If Joint orientation angle is abnormal

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Malalignment Reasons

- If MAD exceeds its normal range → Malalignment
- Malalignment causes-
 1. Femoral deformity
 2. Tibia deformity
 3. Joint problem
 4. Condylar deficiency
- To know the cause, do
- Malalignment test (MAT)-



Steps of MAT

- Measure the MAD
- Measure mLDFA and mMPTA 
- Measure JLCA – Convergence angle 
- Check for condylar deficiency



JLCA ($0-2^\circ$)
↓
Convergence

DEFORMITY CORE

JRAG TIWARI



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MTAT

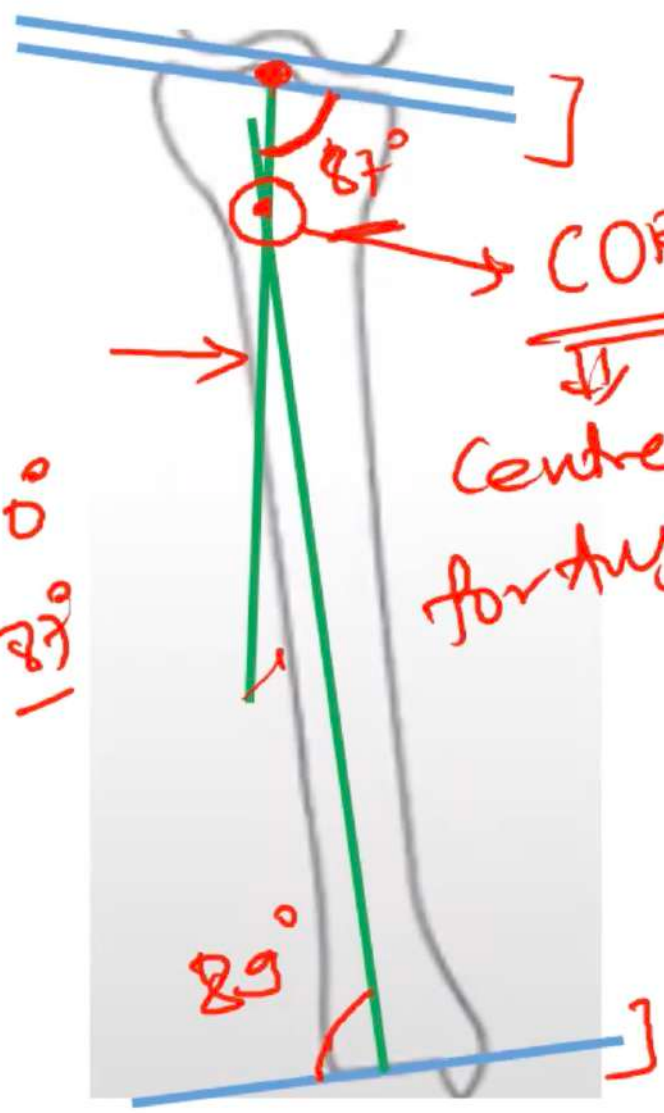
LPFA
= 90°

LPFA
= 87°

JLCA = 0°
87°

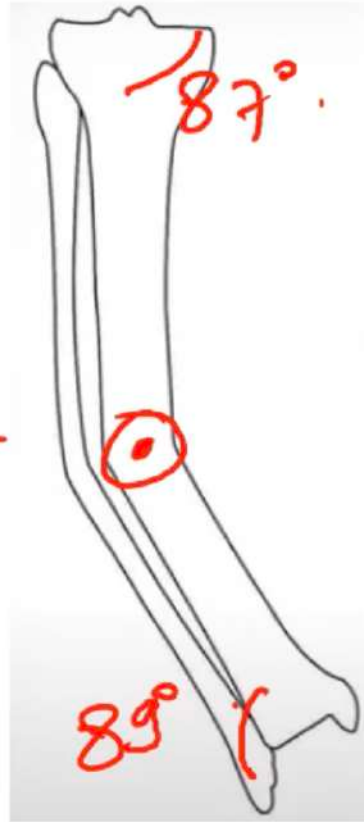
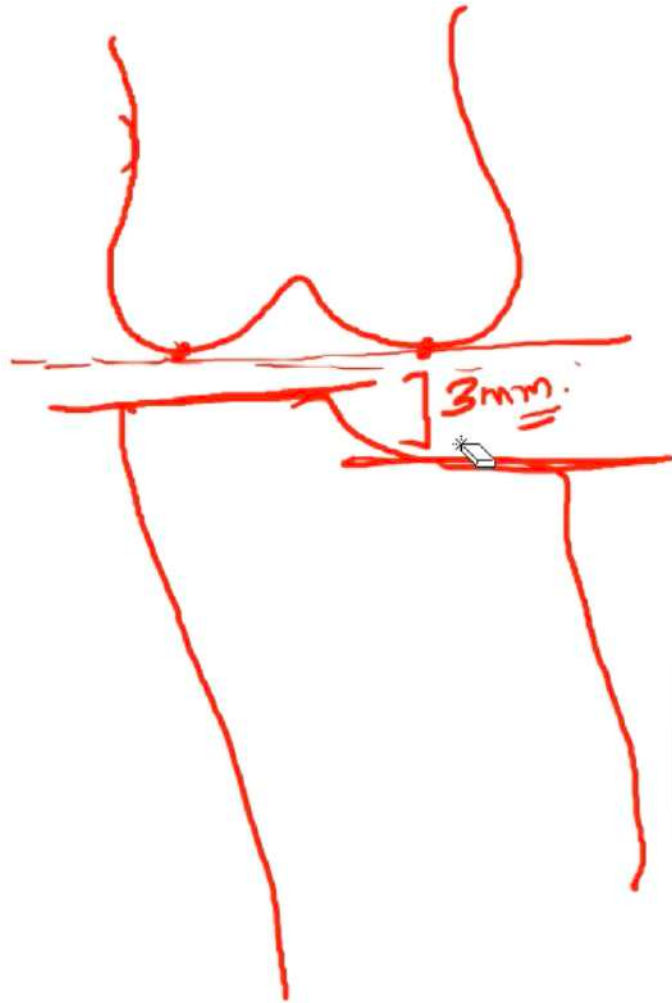
MPTA
70°

LDTA
89°



CORA

Centre of Rotation
for Angulation



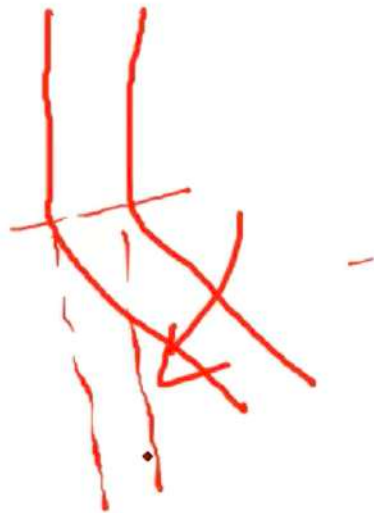
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CORA

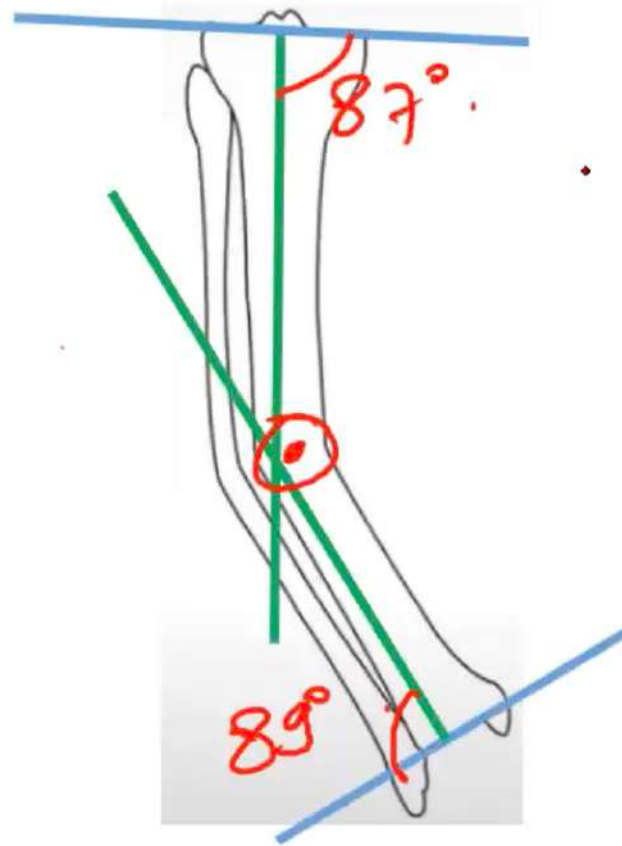
- Centre of Rotation of Angulation
- If a bone is angulated, there will be proximal and distal axes.
- The point where they meet is CORA

CORA - Concepts of Osteotomy

- What are the rules of osteotomy



CORA



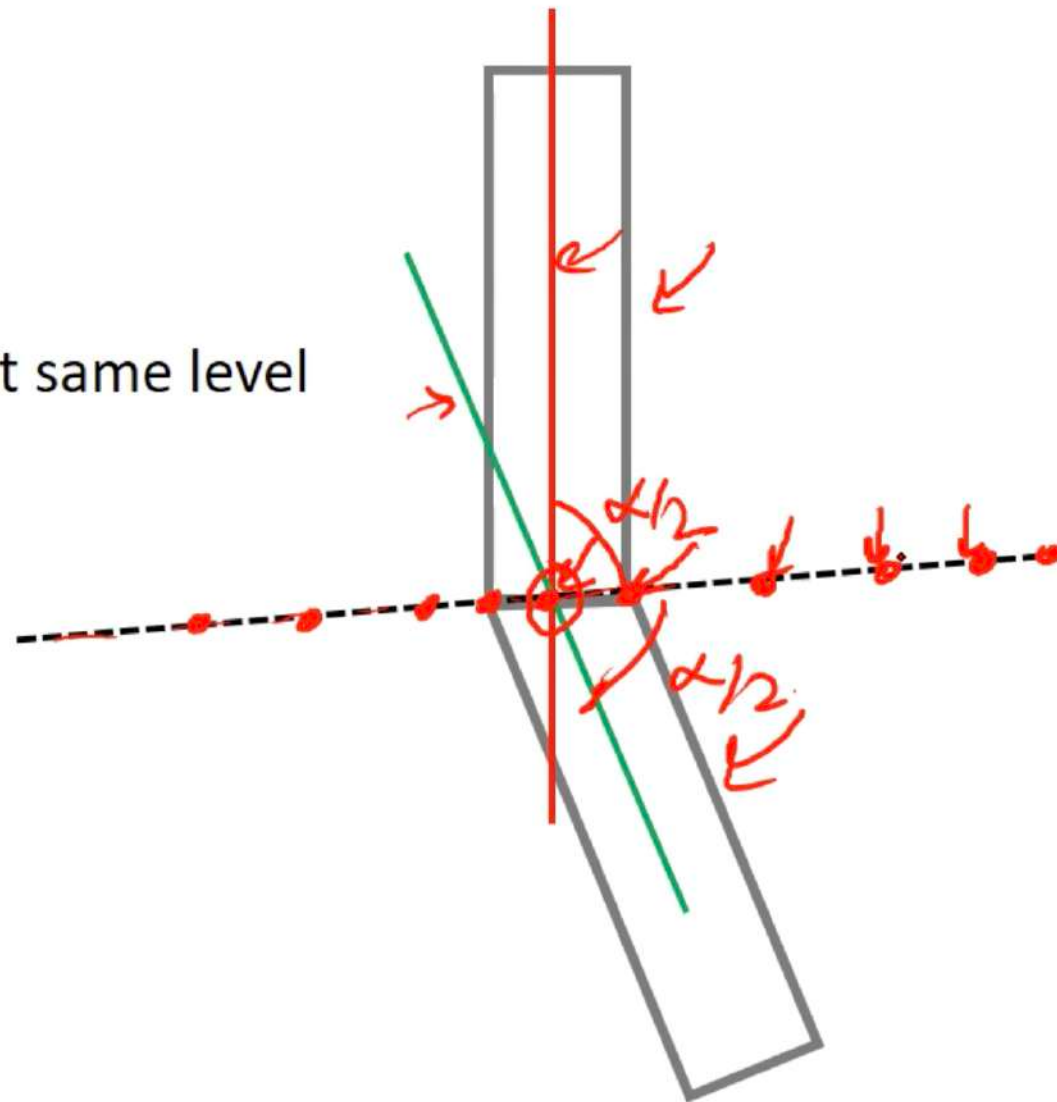
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Before doing osteotomy, You must know ...

- Location of CORA
- The correction axis
- Location of osteotomy

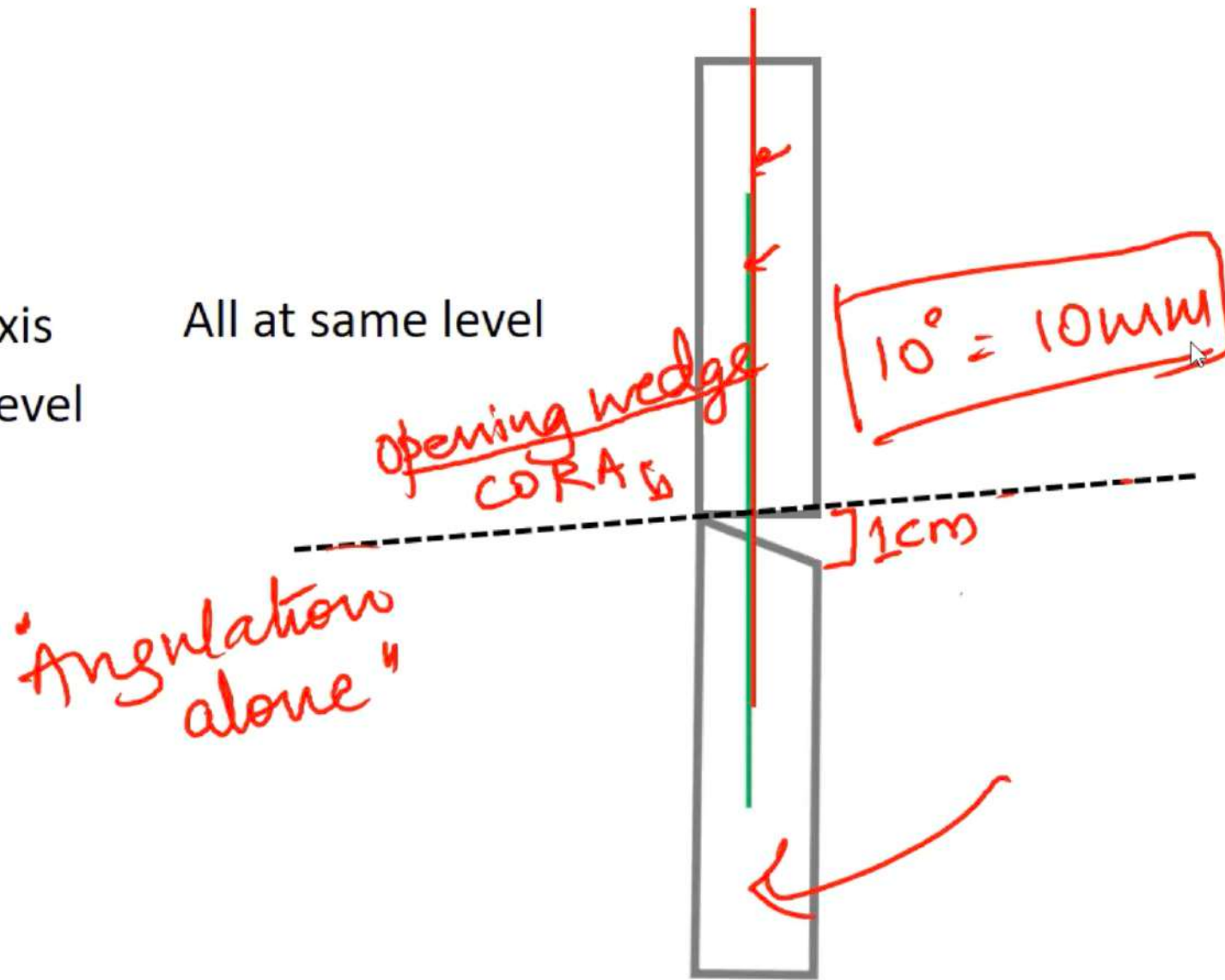
- CORA
- Correction axis
- Osteotomy level

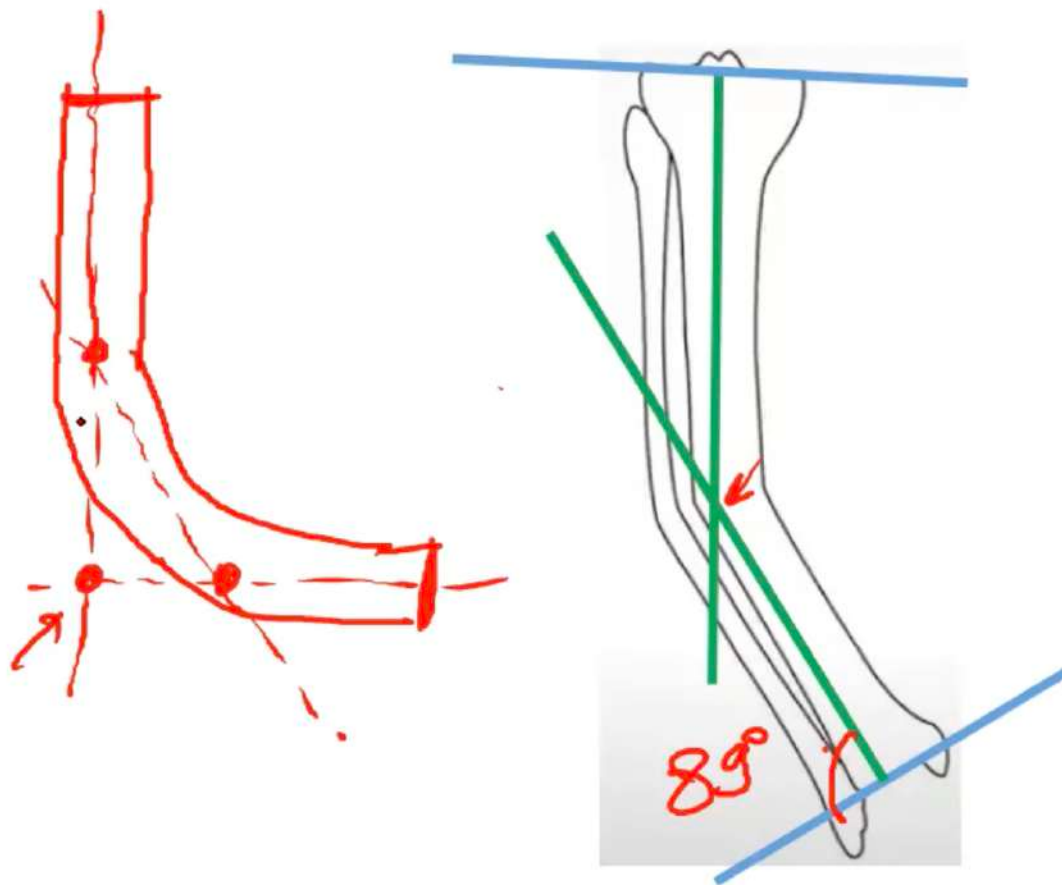
All at same level



- CORA
- Correction axis
- Osteotomy level

All at same level

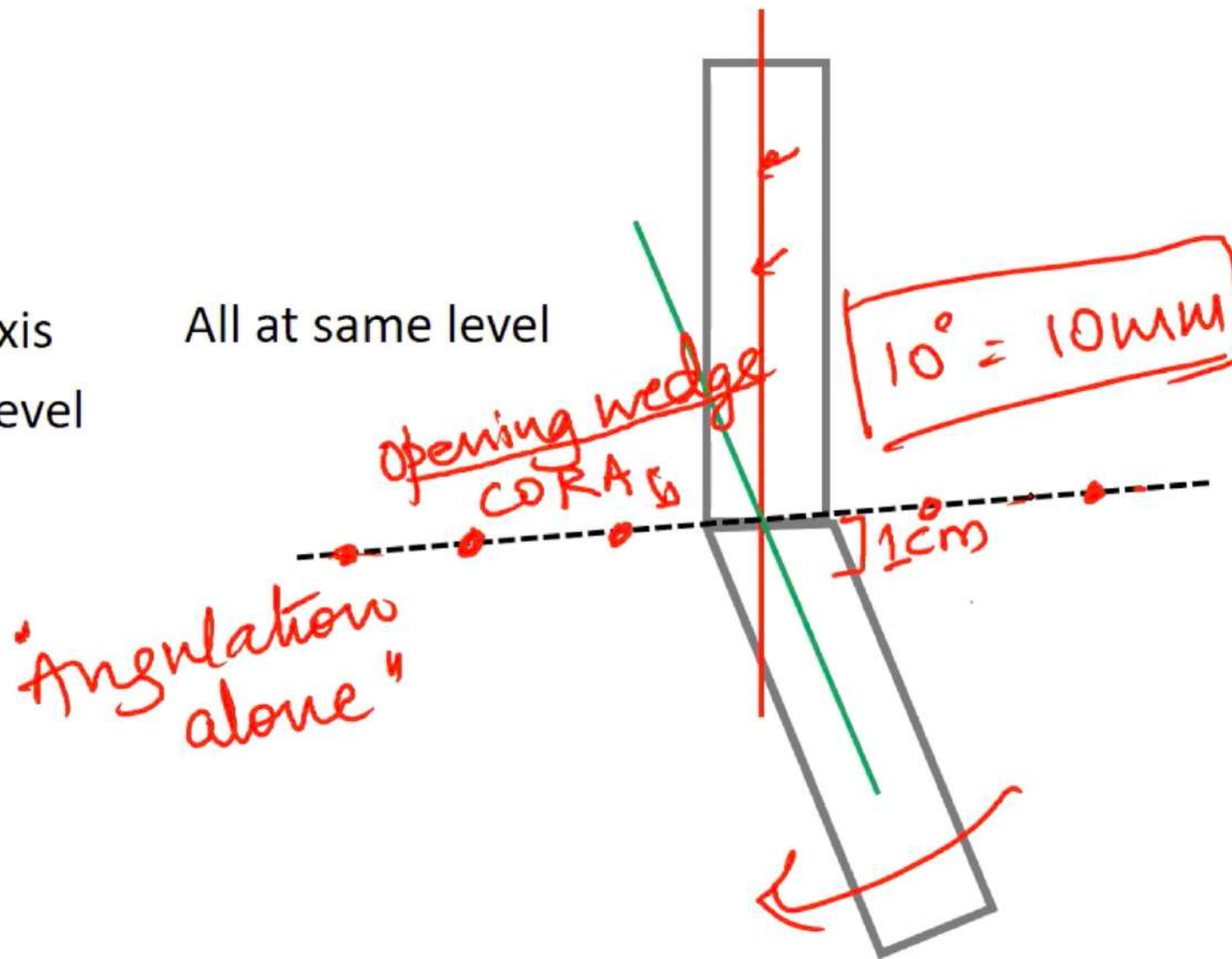




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- CORA
- Correction axis
- Osteotomy level

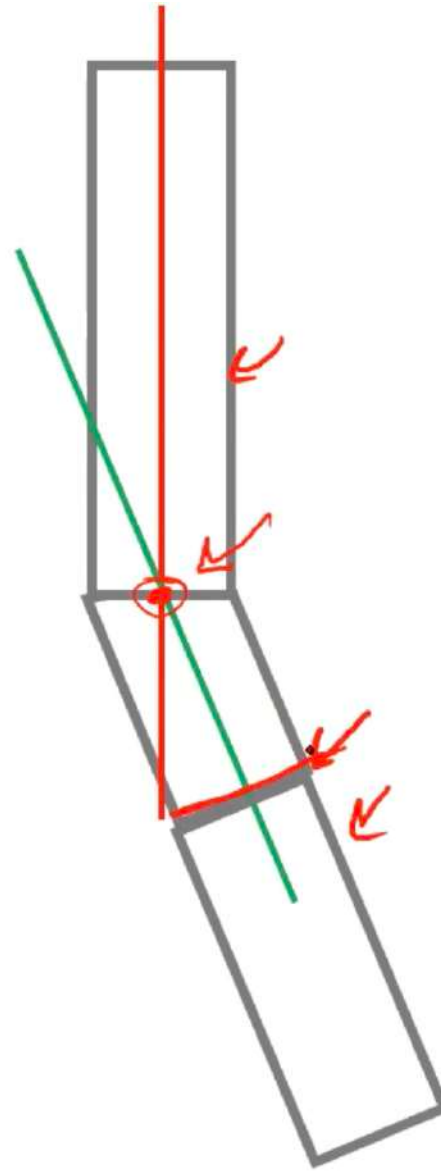
All at same level



- CORA
- Correction axis
- Osteotomy

Same level

Different level

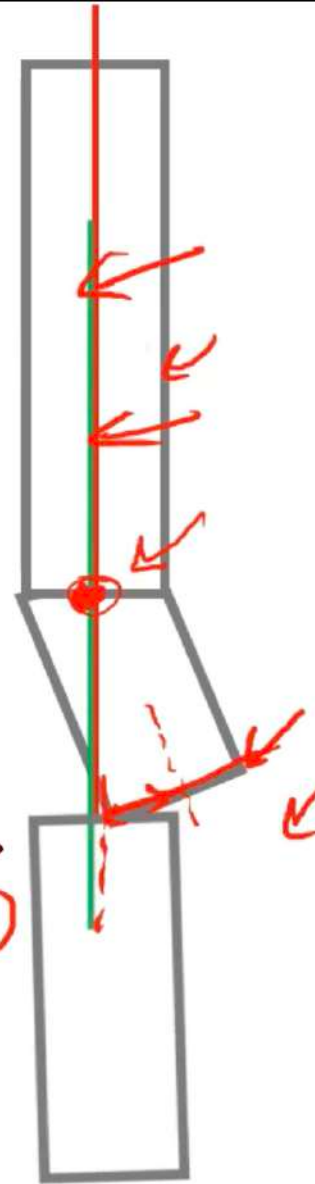


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Osteotomy Rule 2

- CORA
 - Correction axis
 - Osteotomy
- Same level
- Different level

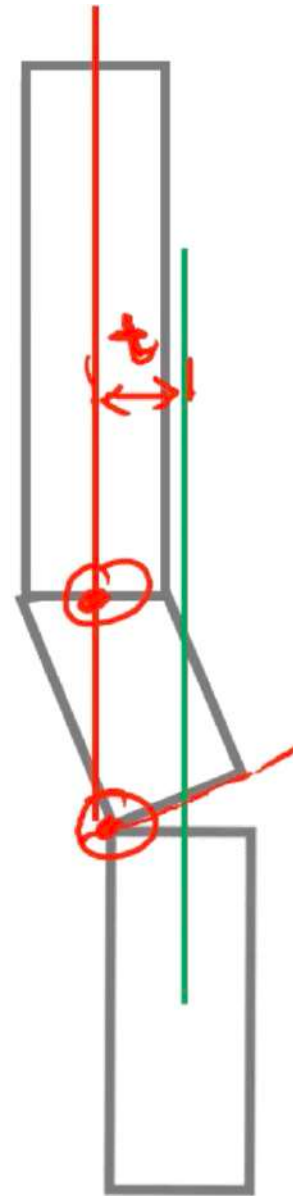
Angulation $\hat{c}$
relative
translation



Osteotomy Rule 3

- CORA different level
- Correction axis Same or different level
- Osteotomy

Angulation
i iatrogenic
translation
def.



Order of Correction ?

AURT

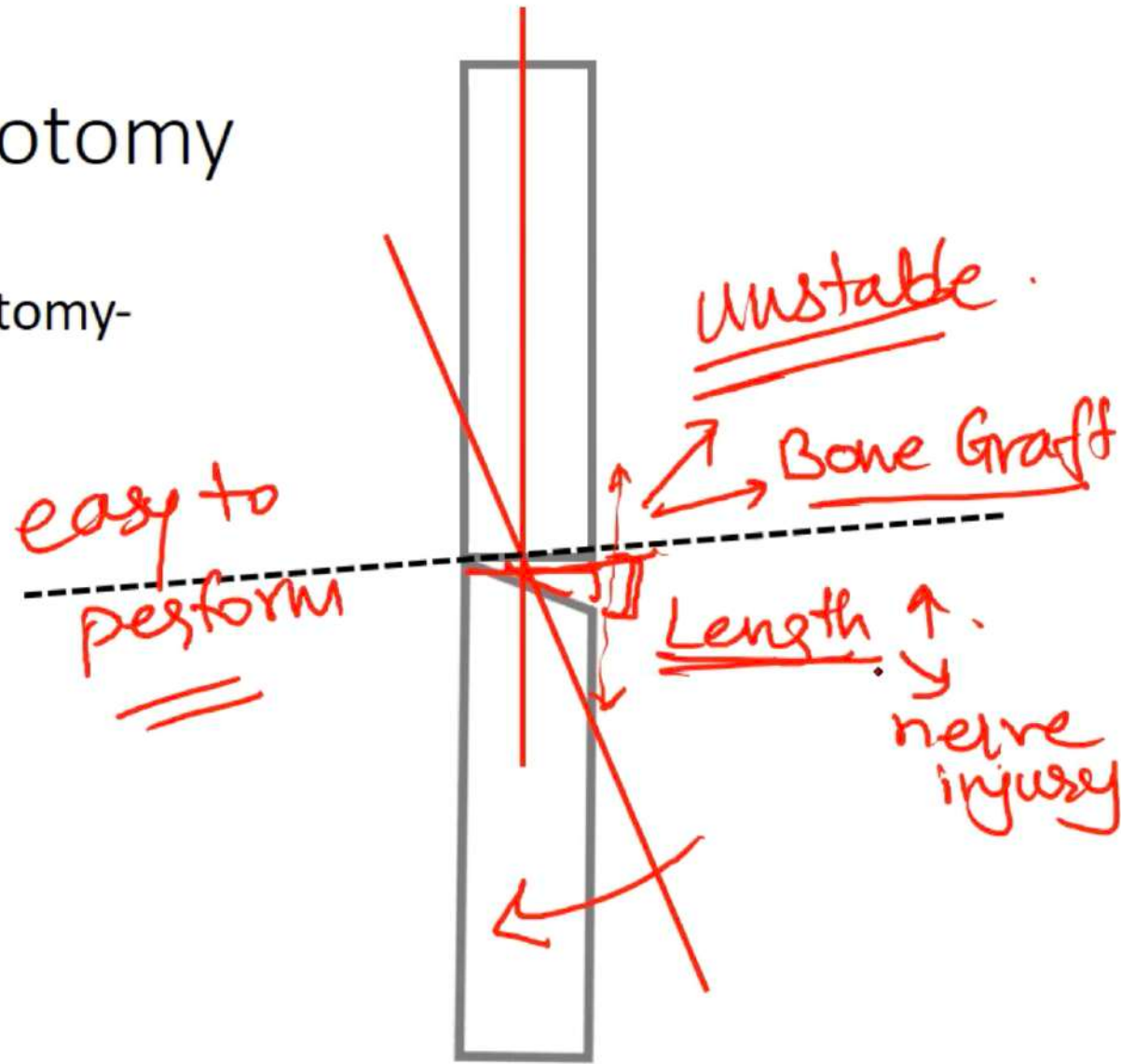
- Angulation
- Length
- Rotation
- Translation

Types of osteotomy

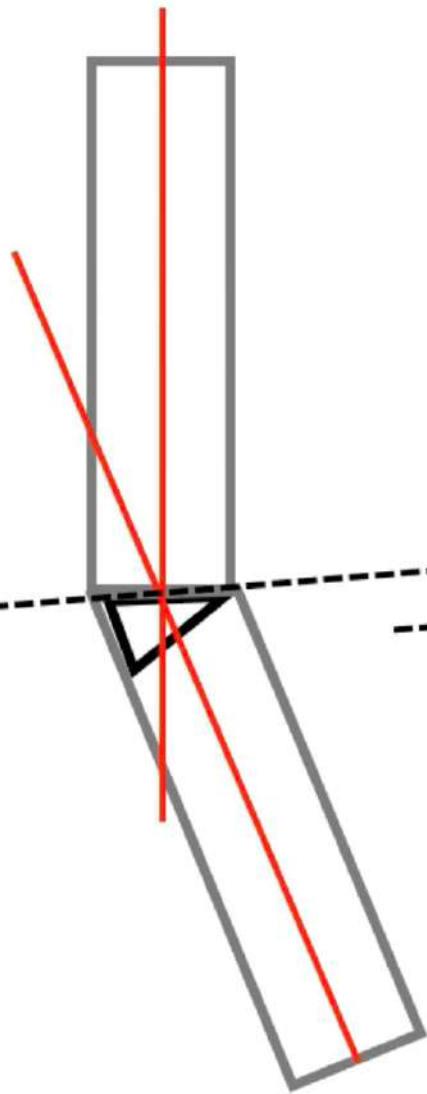
- Open Wedge
- Close wedge
- Dome osteotomy

Types of osteotomy

- Open wedge osteotomy-



Close wedge osteotomy

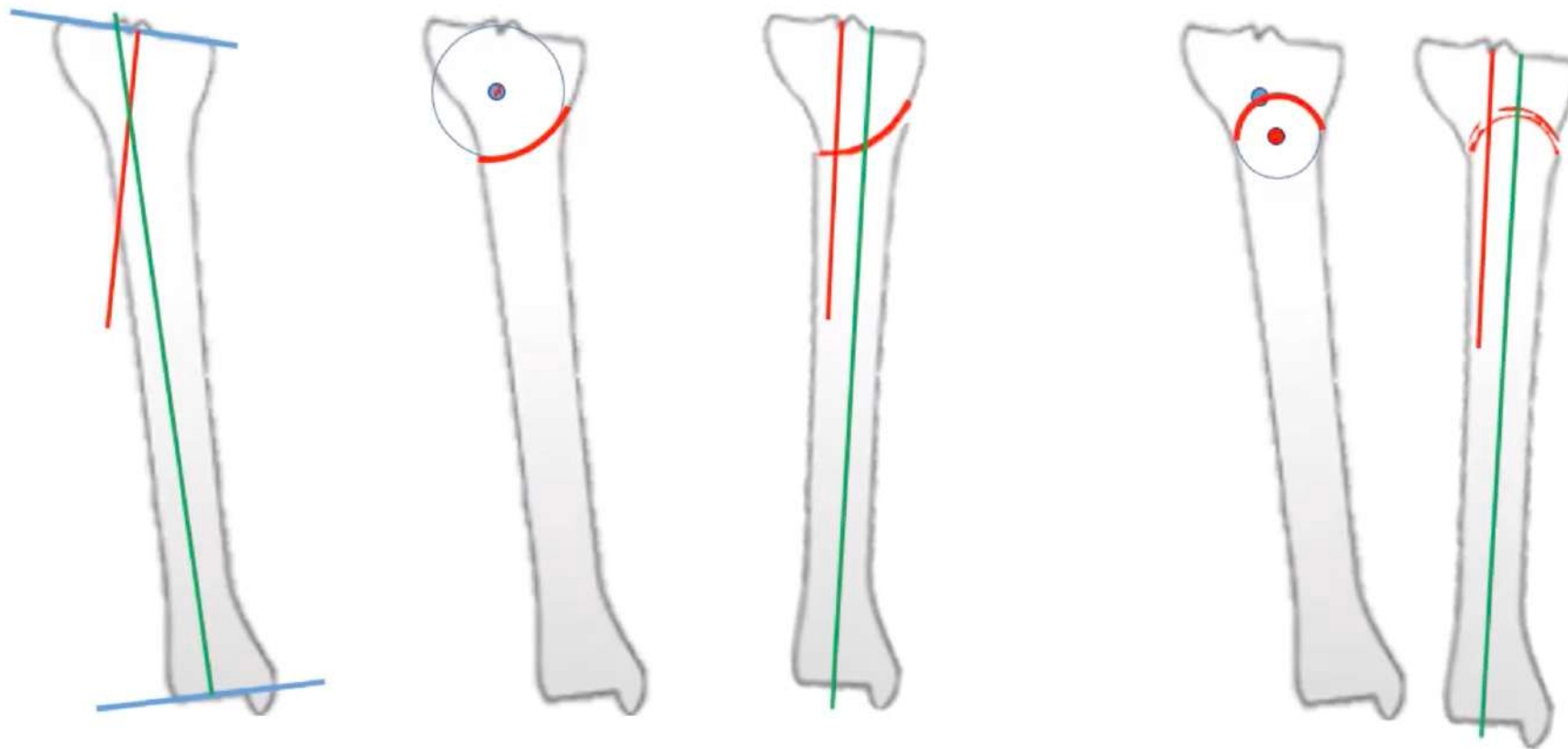


Shortening



- Stable
- No BG req.
- Shortening ⊕
- No nerve or vessel.

Dome osteotomy



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Oblique plane deformity



$$(\text{Oblique})^2 = (\text{AP})^2 + (\text{Lat})^2$$

$$\begin{aligned} & (\text{oblique def})^2 = a^2 + b^2 \\ & \left[x = \sqrt{a^2 + b^2} \right] \end{aligned}$$