Solving Distal Locking and Spinal Orthogonal Views

A unified theory of superimposition Radiography

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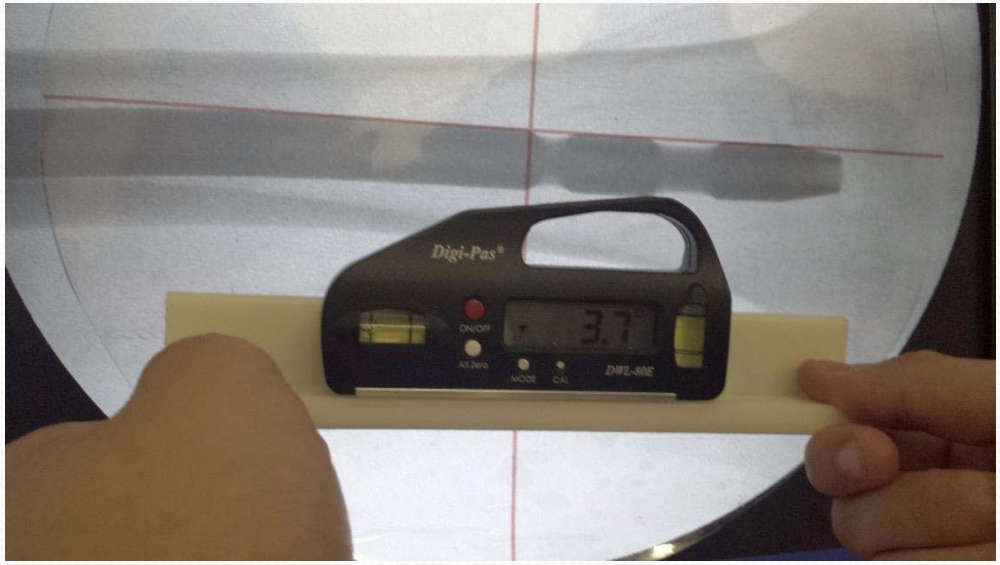
Overview

- 5 years of research in Mobile C-arm navigation and superimposition views
- Fundamentals of X-ray beam geometry answer most problems of positioning, measurement and superimposition.
- Spinal surgery images without 3D navigation need to be orthogonal (Superimposing/aligning vertebral end plate)
- Distal locking views of femoral nail C-arm needs to be adjusted to superimpose screw holes
- Plain film superimposition views can also be directed or corrected

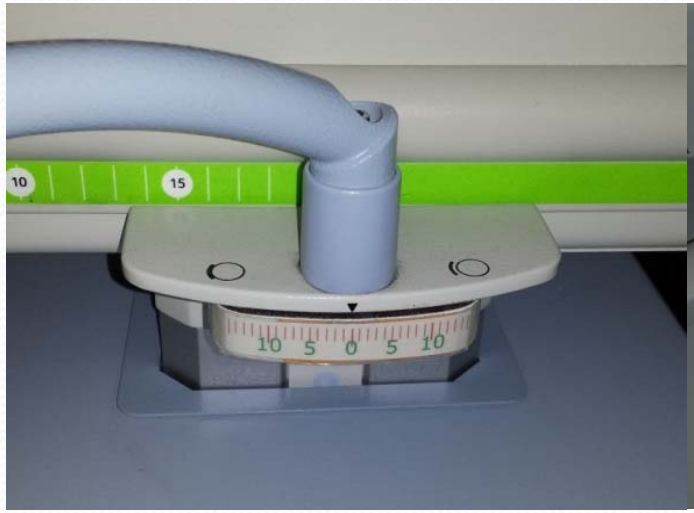
Measuring nail Angulation from C-arm

- Take AP view of distal end of nail
- Zero the image rotation
- Measure the slope of the nail on the image



Angular Measurement

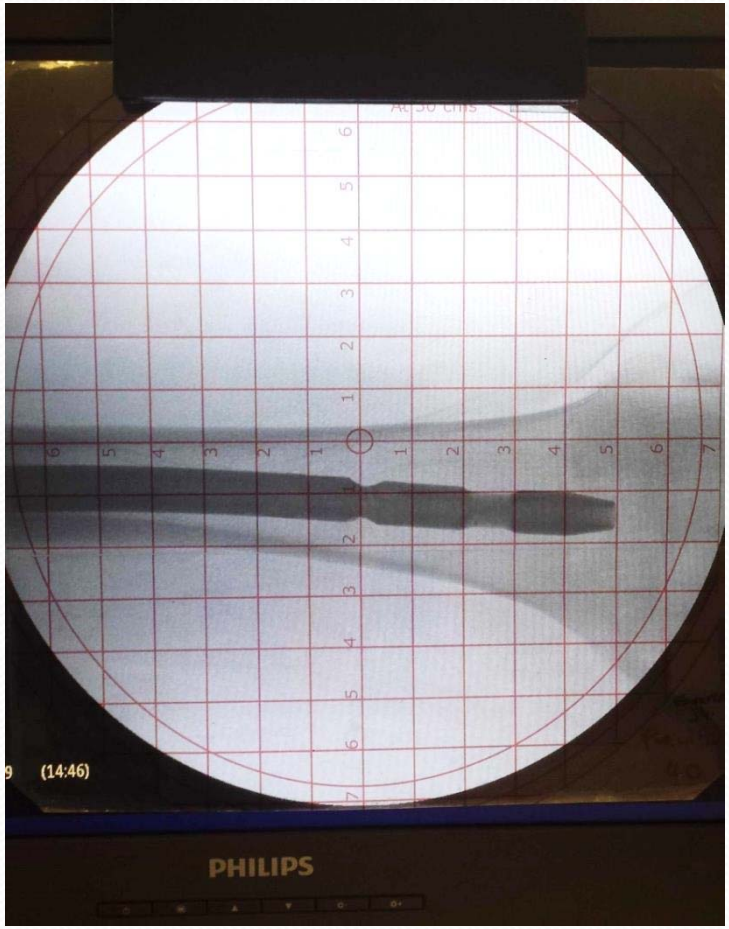
- Pan the C-arm this far
- If no protractor on C-arm pan 2x degrees along leg



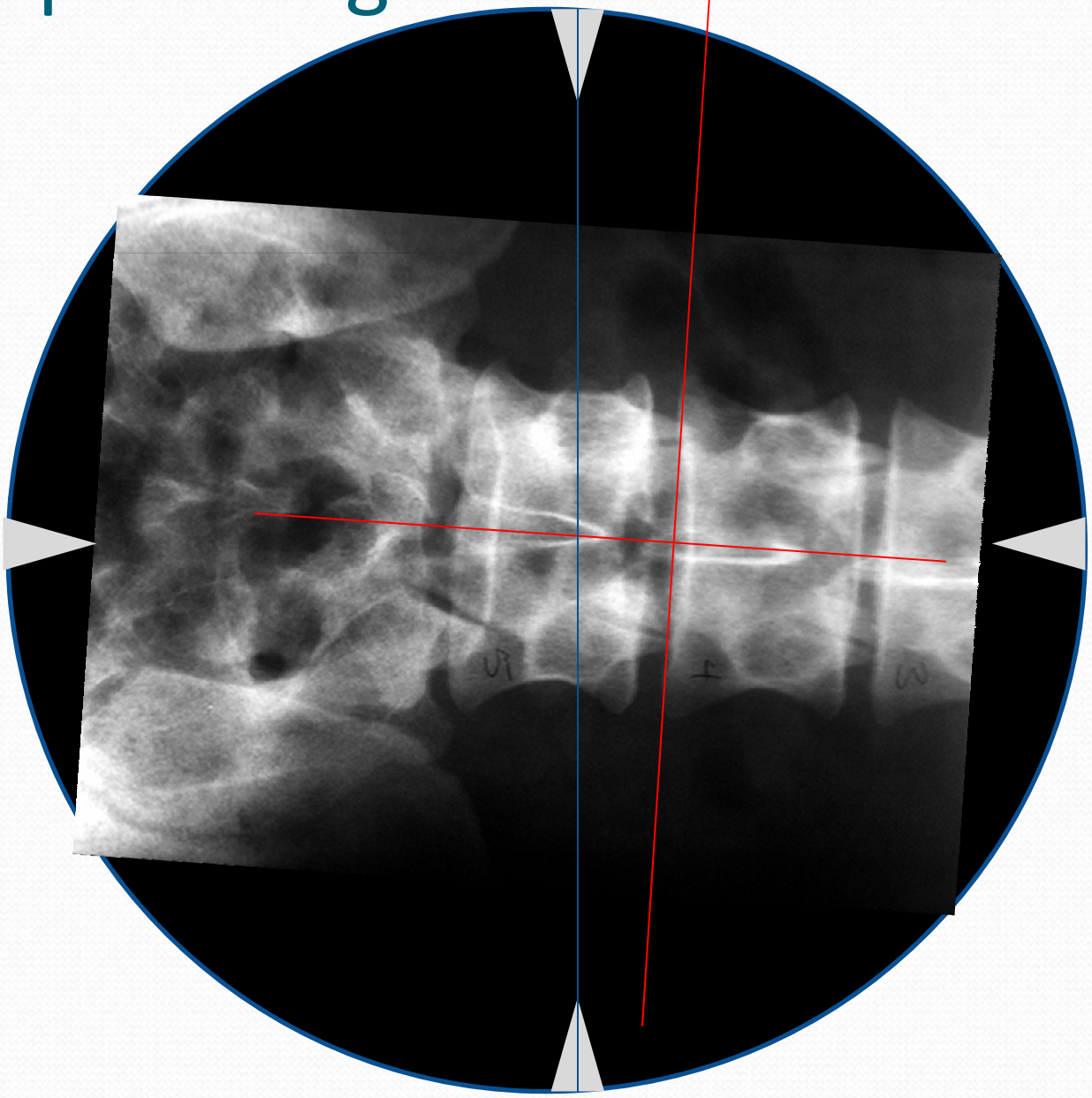
Lateral Movement

Measuring to centre

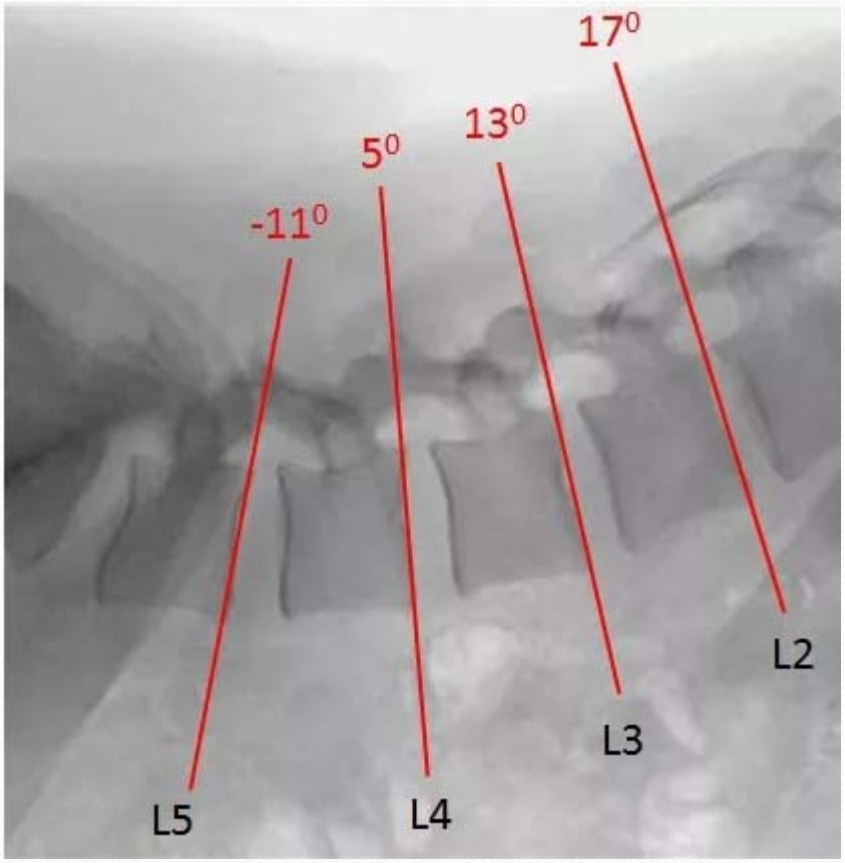
- Turn track handle sideways and track back to locking hole



End plate angulation measurement



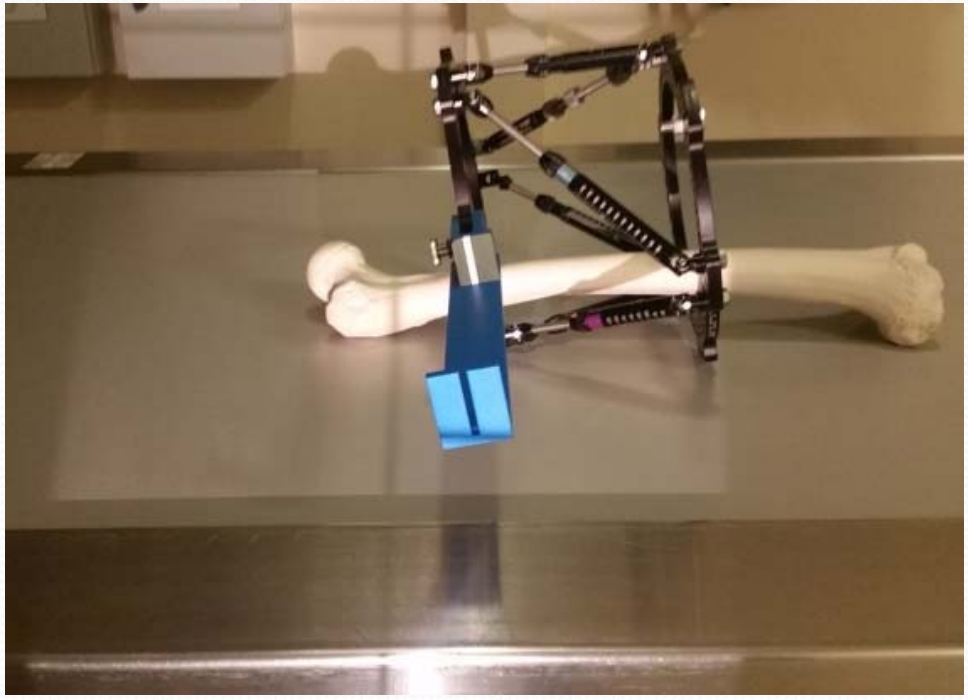
End plate angulation measurement



TSF Shadow Tool

- X-rays are shadows
- Angle to any collimation position
- No loss of orthogonal viewpoint
- Same applies to Tibia for knee or ankle
- Forearm for wrist or elbow

TSF Shadow Tool



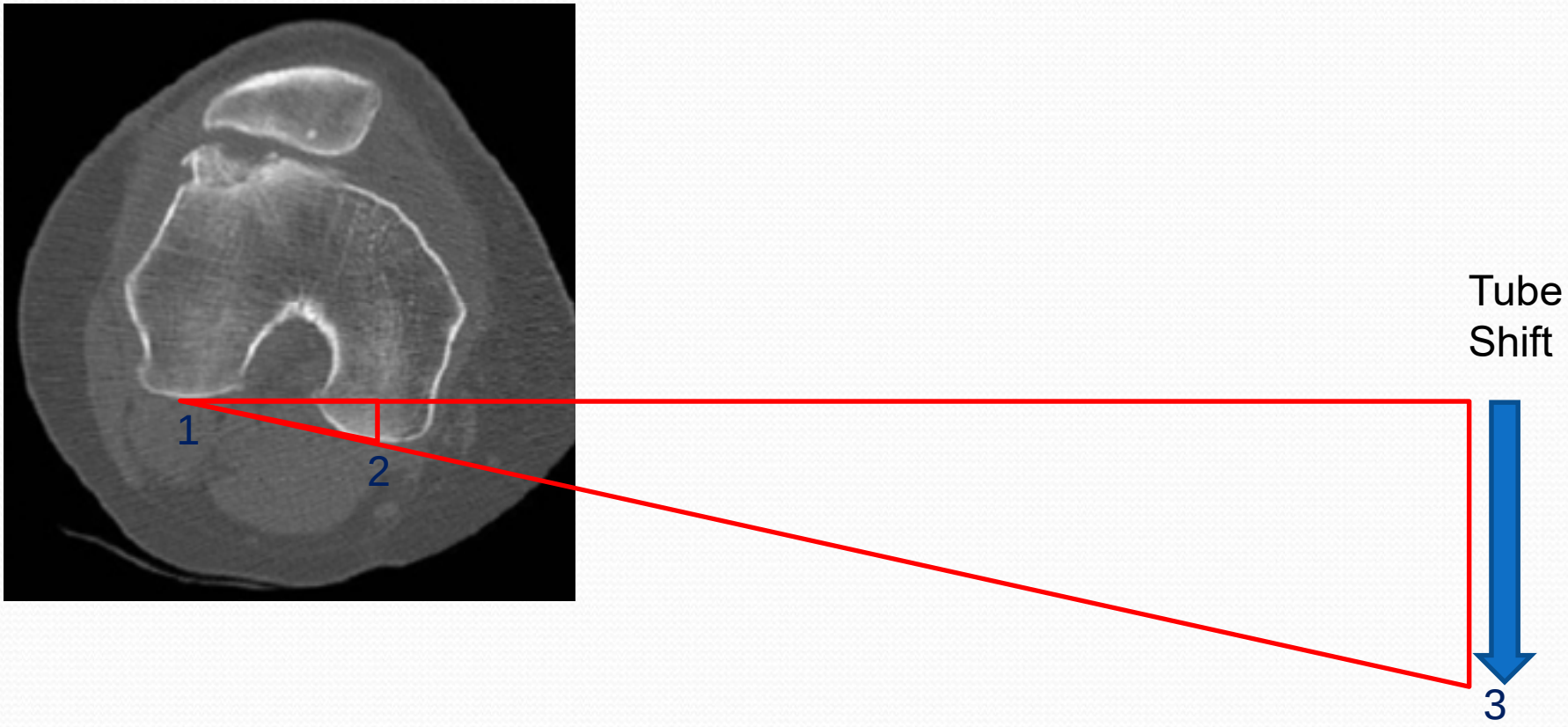
Lateral Knee Correction

1cm Externally rotated

20cm Tube Shift Down

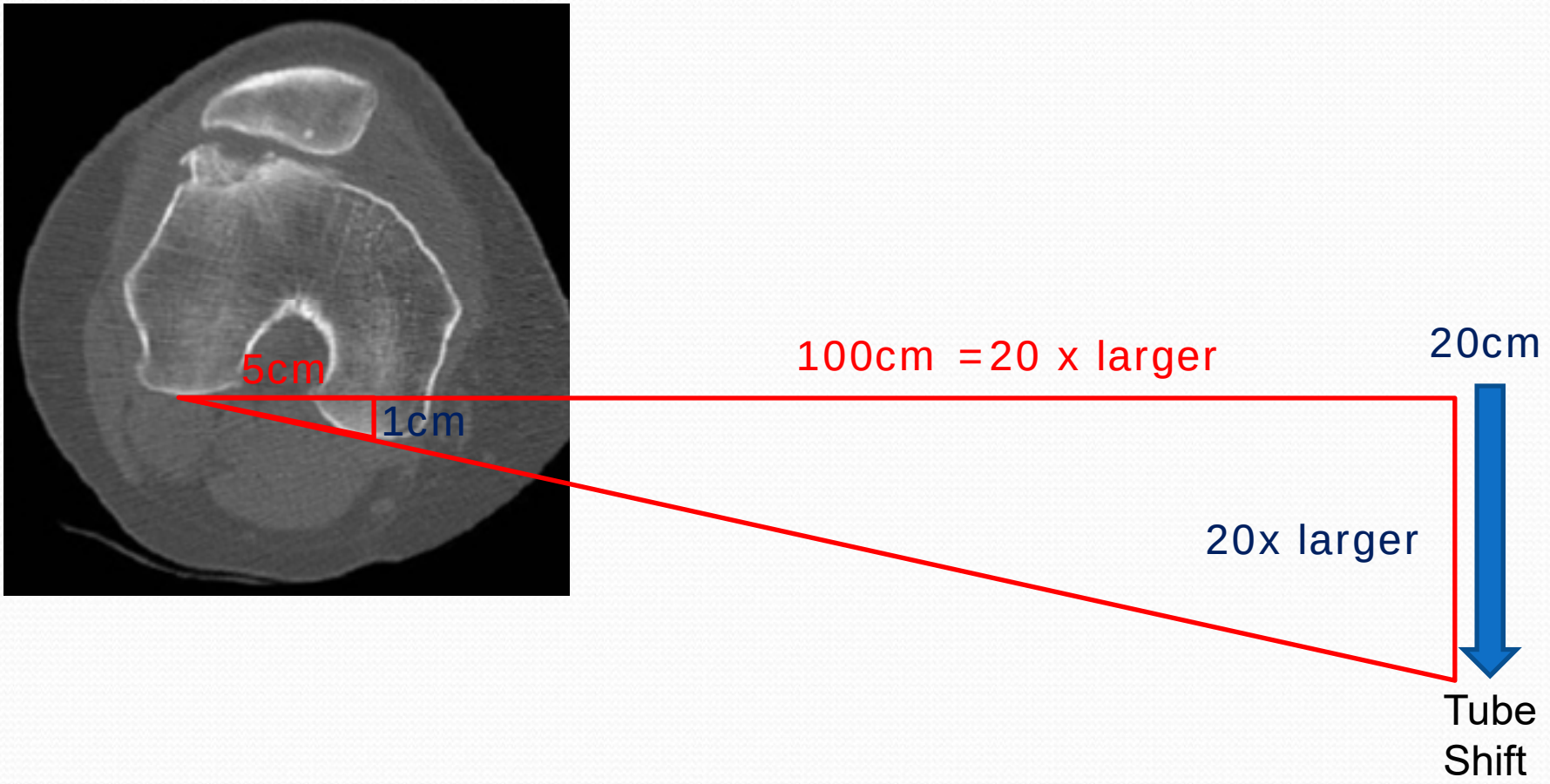
Lateral Knee

- Superimposition Views
- Three points on a straight line
- Two are in the patient, the third is the focus of the X-ray tube.



Lateral Knee

- Knee externally rotated with for example a 1cm error in superimposition
- Approximation of intercondylar distance (Median Value 5cm)
- Tube shift is 20cm at FFD 1m



Plain Film

- Superimposition Views
- Lateral knee
- Mortise Ankle
- AP Chest
- C-spine Peg
- Lateral wrist (especially in plaster)
- Lateral Elbow (especially trauma)
- Facial, skull and mandible views
- Lateral Scapula
- TSF Frame Reference ring and Ilizarov views
- Theatre Distal Locking
- Theatre Orthogonal Spine Views
- Theatre TSF and Ilizarov ring orthogonal views.

Laser Chest alignment tool

- Eliminates rotation from AP chest X-rays
- Regardless of cross arm angulation
- Works by reproducing a central ray view-point perpendicular to anterior chest wall
- A set correction can be calculated and recorded for scoliosis patients

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