

Solving Distal Locking and Spinal Orthogonal Views

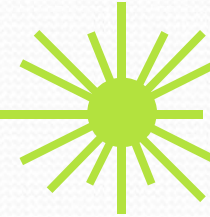
A unified theory of superimposition Radiography

Gareth Robinson

Theatre Lead Radiographer

Leicester Royal Infirmary

Overview



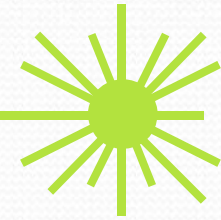
- 5 years of research in Mobile C-arm navigation and superimposition views
- Fundamentals of X-ray beam geometry answer most problems of positioning, measurement and superimposition.
- Spinal surgery images without 3D navigation need to be orthogonal (Superimposing/aligning vertebral end plate)
- Distal 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



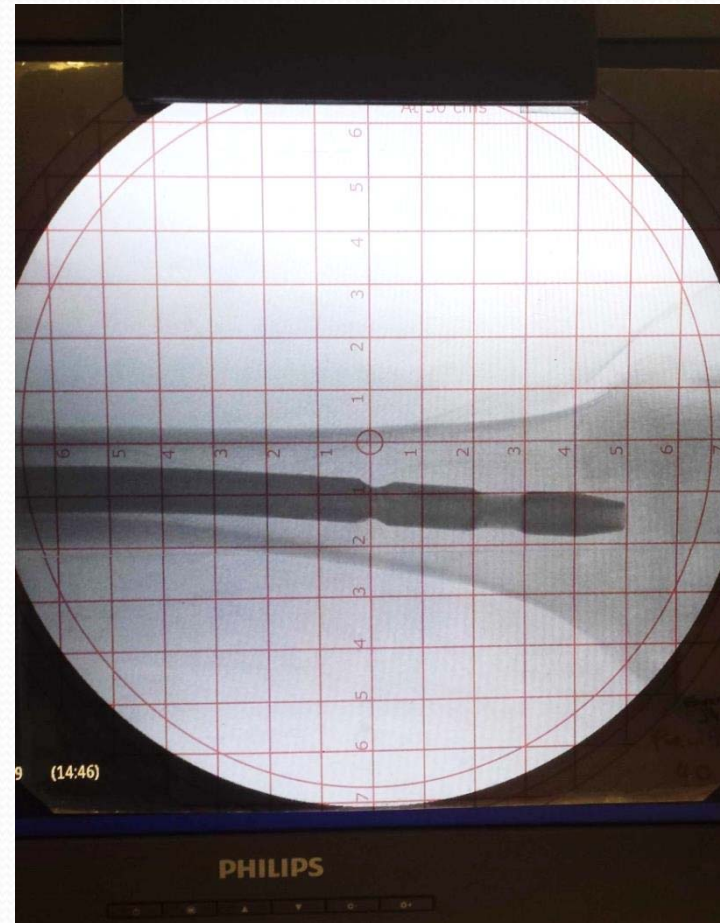
Lateral Movement



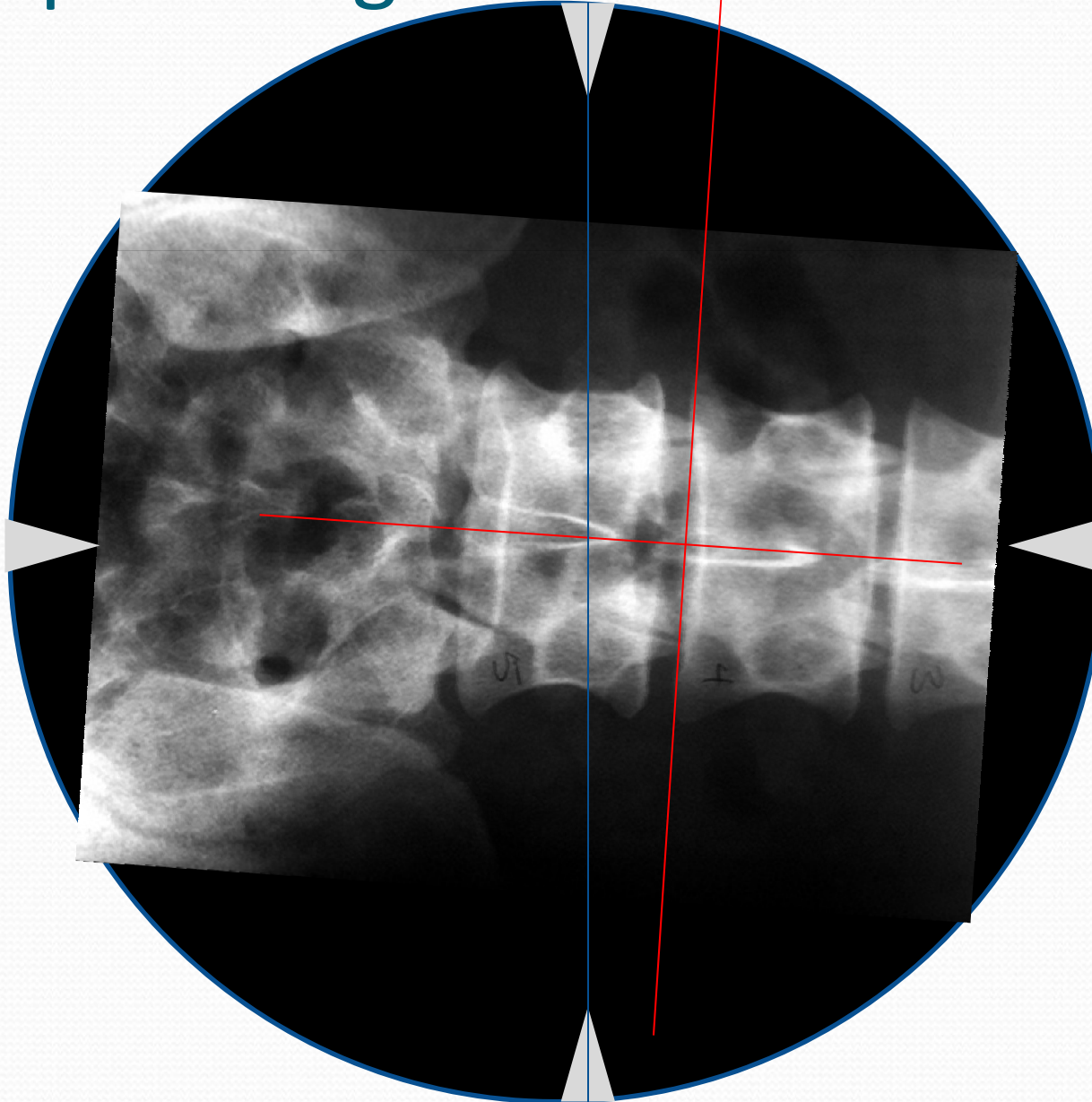
Measuring to centre



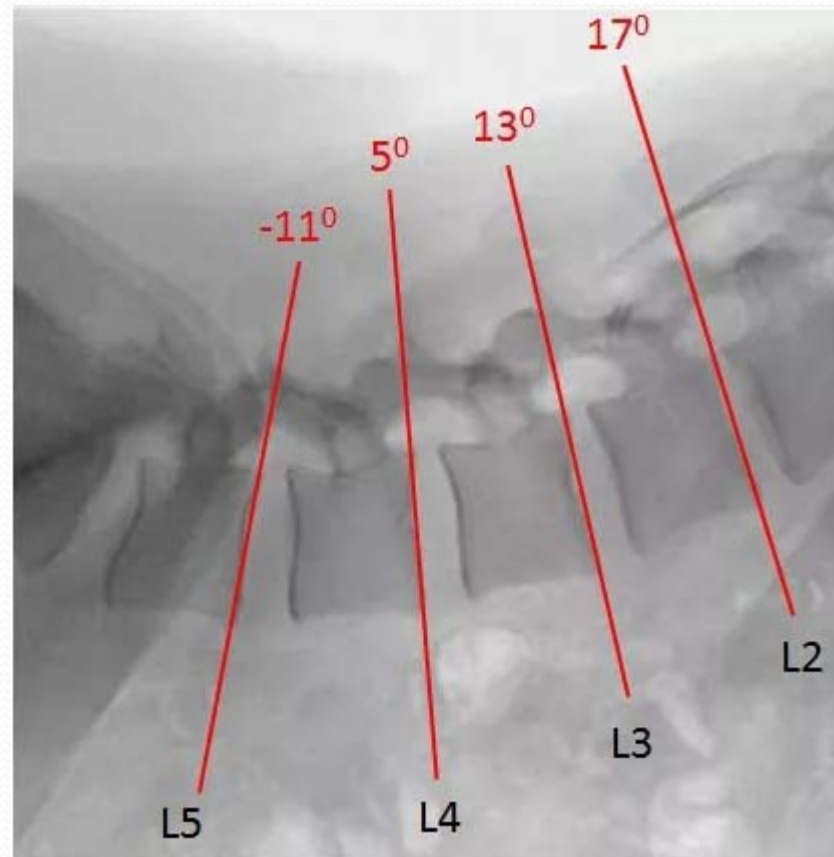
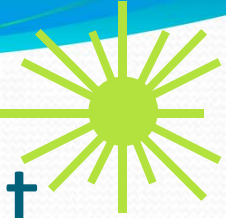
- Turn track handle sideways and track back to locking hole



End plate angulation measurement



End plate angulation measurement





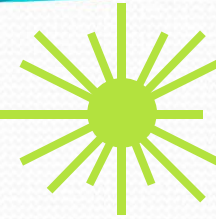
TSF Shadow Tool

- 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



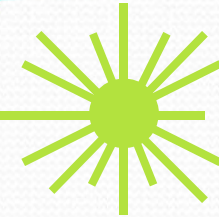
1cm

1cm Externally rotated

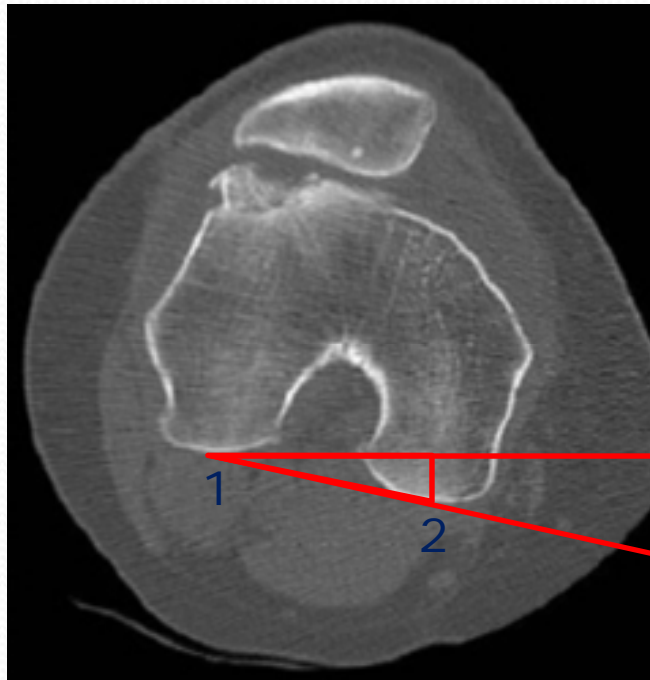


20cm Tube Shift Down

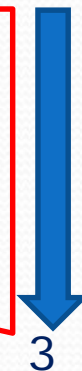
Lateral Knee



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



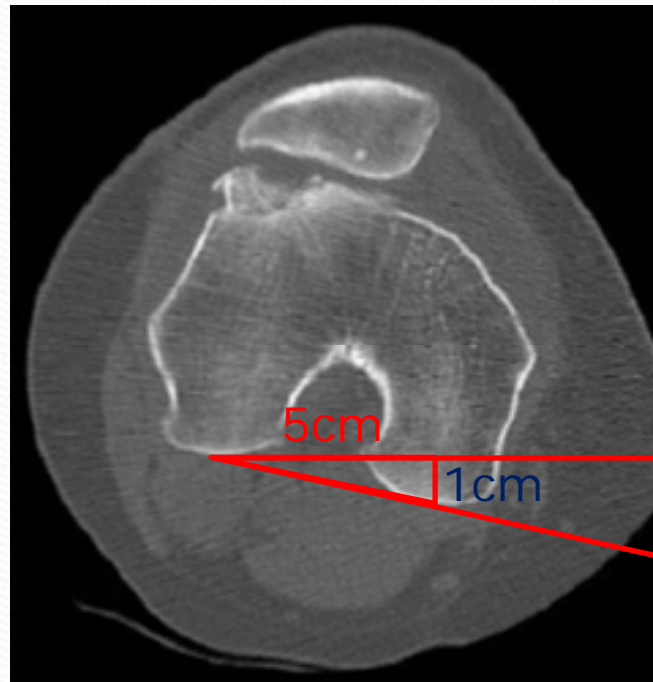
Tube Shift



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



100cm = 20 x larger

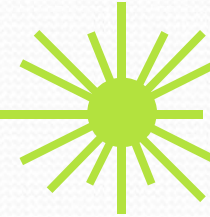
20cm

20x larger



Tube Shift

Plain Film



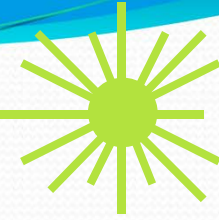
- Superimposition Views
- Lateral knee
- Mortise Ankle
- AP Chest
- C-spine Peg
- Lateral wrist (especially in plaster)
- Lateral Elbow (especially trauma)
- Facial, skull and mandible views
- Lateral Scapula
- TSF Frame Reference ring and Ilizarov views
- Theatre Distal Locking
- Theatre Orthogonal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

Theatreradiography.com



At 20 cms

At 20 cms

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Better Imaging
Better Outcome

THEATRE IMAGING TECHNIQUES

ORTHOPAEDICS

Basics

WHAT EXACTLY IS THE PROBLEM?
Why is it hard to get the views the surgeon needs without missing all too frequently? Isn't the answer just to have a laser centring cross? Theatre Radiography technique explained.
[READ MORE](#)

SETTING UP AND CORRECT ORIENTATION ARE KEY
Which way up and round is the image going to be?
Be in control and know which direction to move and how far.

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[READ MORE](#)

CAN I REALLY KNOW HOW FAR

By Case

DYNAMIC HIP SCREW
Bread and butter Orthopaedics but even experienced Radiographers may find a few tricks here.

[READ MORE](#)

Hand and Wrist Surgery
The correct way to screen the wrist and forearm on the hand table. Know which way to move irrespective of anatomy and how far to move to centre confidently.

Navigation

IOTA C-ARM NAVIGATION
A system of screen overlays and measuring scales which allow for some surprisingly sophisticated navigation techniques.

IOTA 3D Printing Project
The IOTA technique often makes use of a protractor scale which is not provided on all C-arms. I have previously built a fully functioning Pan motion protractor for the Philips Libra/Endura C-arms but now the files to 3D print key components for this useful tool are being produced. [Link to 3D component in Tinker CAD.](#)