

Radiographic Evaluation of Scoliosis and Cobb Angle Measurement

Introduction

Scoliosis is a spinal deformity characterized by an abnormal lateral curvature of the spine measuring greater than 10°. Radiographic images are used to diagnose and evaluate severity and progression of the curve over time, with Cobb angle serving as the standard method of measurement. Accurate assessment relies on proper and consistent imaging technique.

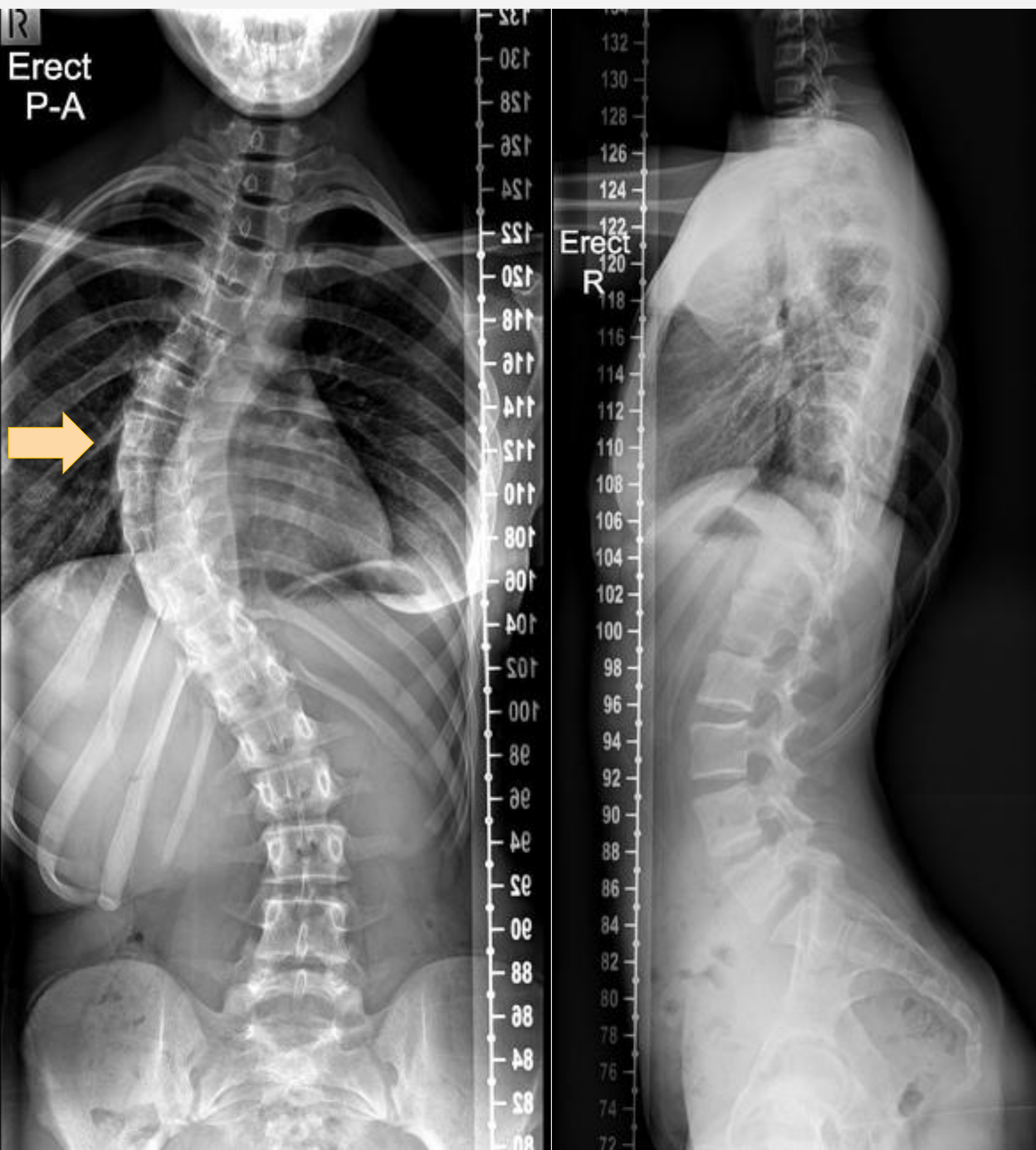


Figure 1. Full spine erect PA radiograph.³

Figure 2. Full spine erect lateral radiograph.³

Standard Projections

- PA or AP full spine
 - Demonstrates possible scoliosis³
- Lateral full spine
 - Demonstrates possible kyphosis, lordosis & spondylolisthesis⁴

Additional Projections

- Lateral bending views
 - Demonstrates lateral flexibility⁵

Radiographic Techniques

Patient Positioning

- Weight bearing
 - Presents the natural curve of the spine under gravity⁶
- Midsagittal plane centered
- Minimize rotation of hips and shoulders⁶
- Side of greatest convexity closest to the IR
 - Minimizes magnification⁷



Figure 3. Standing PA full spine projection.⁸



Figure 4. Standing lateral full spine projection.⁸

Anatomy visualized

- Thoracic and lumbar vertebrae
- Superior portion of iliac crests



Figure 5. Left and right lateral bending radiographs.⁵

Cobb Angle Measurement

Measurement Process

1. Identify superior vertebra with most inferiorly tilted endplate
2. Identify inferior vertebra with most superiorly tilted endplate
3. Draw lines along the endplates
4. Measure the intersecting angle to determine the Cobb angle¹

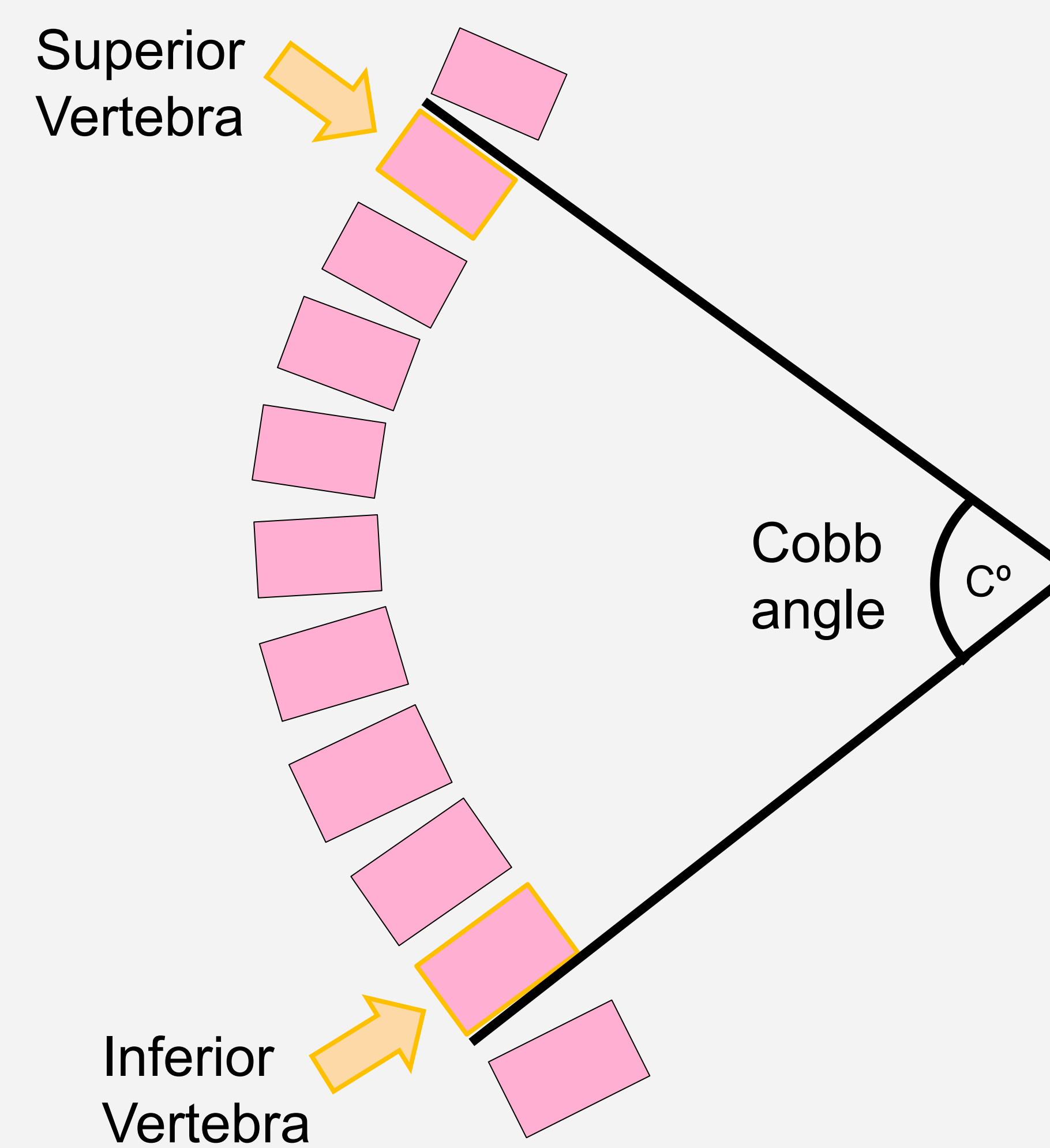


Figure 7. Cobb angle measurement method demonstrated on spine.

Alternative Method

Perpendicular lines may be drawn if endplate lines do not intersect within the field, and that angle may be used.¹

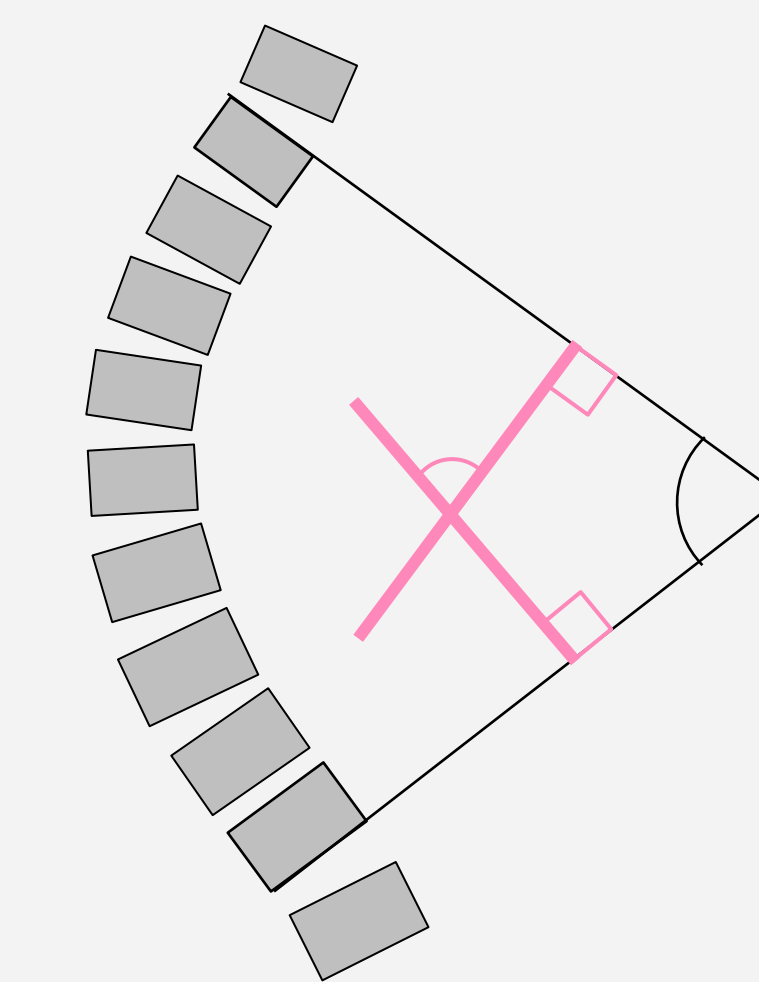


Figure 8. Alternative Cobb angle measurement method.

Clinical Impact

- Treatment is based on Cobb angle measurements
- Inconsistent imaging may incorrectly suggest progression of scoliosis

Accuracy & Dose Reduction

Consistency & Accuracy

- 5° measurement variability due to measurement process²
- Rotation of spine may alter angle as much as 20°¹
- Inter-observer variability may occur

Dose Reduction Methods

- Pediatric populations often undergo scoliosis screening
- PA over AP projections to reduce anterior exposure⁹
- Applying ALARA principles
- Use compensating filters to even out image density⁹

Conclusion

Accurate positioning directly affects Cobb angle reliability. Consistency across follow-up examinations is essential. Technologists play a critical role in balancing diagnostic quality and radiation safety.

References

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