Three-dimensional postural parameters that differentiate scoliotic curves.

Zajbcek K F\textsuperscript{1,2}, Coillard C\textsuperscript{1,2}, , and Rivard CH\textsuperscript{1,2}

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PATIENT EVALUATION
OBJECTIVE

The objective of this study is to evaluate the posture of Idiopathic Scoliosis patients, and make a comparison based on conventional radiological classification.
METHODOLOGY

• **Patient Population** :
  - 62 Idiopathic Scoliosis Patients (age: $12 \pm 3$ years)
    - 50 female and 12 male
    - 19 Left Thoracolumbar (LThL)
    - 25 Right Thoracic (RTh)
    - 18 Right Thoracic Left Lumbar (RThLL)

• **Evaluation** :
  - Radiological
  - Postural Geometry
RADIOLOGICAL EVALUATION
POSTURAL GEOMETRY EVALUATION

- Motion Analysis System
  - 8 video cameras
  - posterior/anterior view
  - 3-D reconstruction
  - input for calculation of postural parameters
POSTURAL PARAMETERS

- Head
- Scapular Girdle
- Thorax
- Pelvic Girdle
- Spine

Rotation
Tilt
Version
AP Shift
ML Shift
Height
Rib Prominence
Deviation (Frontal, Sagittal)
INTERPRETATION OF POSTURAL GEOMETRY

Angular Measures

- Rotation (Apical View)
- Tilt (Posterior-Anterior view)
- Version (Left lateral view)

+ Counter Clockwise
- Clockwise
## DIFFERENCES BETWEEN GROUPS

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<tr>
<th>Tilt</th>
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<th>R- Th</th>
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* LThL vs Rth  
**LThL vs RThLL  
***Rth vs RthLL
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* LThL vs Rth    **LThL vs RThLL    ***Rth vs RThLL
## DIFFERENCES BETWEEN GROUPS

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* LThL vs Rth  **LThL vs RThLL  ***Rth vs RthLL
CHARACTERISTICS RIGHT THORACIC

Patient ID : 181XXXX
Age : 9 years
Gender : Female

X-Ray :
- Curve Type : Right Thoracic
- Curve Limits : T6-L1
- Apex : T9 (Right)
- Cobb : 36°
Patient ID: 146XXXX
Age: 10 years
Gender: Female

X-Ray:

Curve Type: Left Thoracolumbar
Curve Limits: T7-L2
Apex: T12 (Left)
Cobb: 21°
CHARACTERISTICS RIGHT THORACIC LEFT LUMBAR

Patient ID : 146XXXX
Age : 9 years
Gender : Female

X-Ray :

Curve Type : Rthoracic-LLumbar
Curve Limits : T5-T11, T11-L4
Apex : T8 (Right), L2 (Left)
Cobb : 26°, 28°
Postural Characteristics
Transverse Plane

Thoracique Droite
Limites : T6-L1
Apex : T9 (Droite)
Cobb : 36°

Thoraco-lombaire gauche
Limites : T7-L2
Apex : T12 (Gauche)
Cobb : 21°

ThD - LG
Limites : T5-T11,T11-L4
Apex : T8 (Droite), L2 (Gauche)
Cobb : 26°, 28°
Postural Characteristics
Posterior-Anterior View
DISCUSSION

• Posture and Idiopathic Scoliosis
  – Global Relationship with Spinal Curvatures

  – Specific to amplitude of Cobb angle
    • Posture relationship with Cobb angle
      – Scoliometer
      – Moire Topography
DISCUSSION

• Characteristic Posture attributed to:
  – Location of Apex
    • Status of apical and adjacent vertebra
    • Proximity of adjacent body segments
    • Mobility of spinal segments
  – Side of Apex
    • Right vs Left
DISCUSSION

• Clinical Significance:
  - Evolution specific to each type of curvature
  - Treatment different for each type of curvature
CONCLUSION

• Unique postural characteristics for specific Idiopathic Scoliosis Curve Types.
  
  – Unique to a specific anatomical plane

  • Right Thoracic : Rotation in the apical plane
  • Left Thoracolumbar : Tilt in the frontal plane
  • Right Thoracic-Left Lumbar : Rotation/Tilt (Both Planes)
CONCLUSION

Clinical Exam + Radiography + Postural Geometry

Systematic view of Idioapthic Scoliosis

Diagnostic - Prognostic - Treatment