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Three-dimensional reconstructions of Lenke 5C Curves

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Background

With his classification system, Dr Lenke introduced new parameters in radiographic analysis of idiopathic scoliosis, such as lumbar and thoracic sagittal modifiers [1]. Scoliosis is defined as a 3-dimensional (3D) deformity in the frontal, sagittal and horizontal planes. The spine is considered as a heterogeneous beam and is modeled as a deformable wire, with vertebrae represented by beads rotating about the wire. Each vertebra can rotate around the 3D spinal curve, which is a compound of plane regions connected by zones of transition. The 3D spinal curve is uniquely flexed along the plane regions. Biplanar radiographic examination with successive exposures (frontal and sagittal in 30cm × 90cm format), coupled with photogrammetric reconstructions, may be used to recreate the 3D spinal curve.

Purpose

The objective of this study was to identify whether all Lenke 5C curves could have the same 3D representation.

Methods

All patients with Lenke 5C curves that consulted and received frontal and sagittal radiographs in turning plate at one institution in 2012 were recruited. Each patient's characteristics and measurements (i.e., Cobb angles, cervical, thoracic and lumbar sagittal curves, pelvic parameters and election plane characteristics) were recorded.

Results

A total of 61 consecutive Lenke 5C patients (mean age of 12.4 years for 50 girls and 11 boys) were included in the study. Lumbar Cobb angle was between 9° and 50° (mean 18.33°). Pelvic incidence was between 29° and 73° (mean

49.3°) and pelvic tilt between -6° and 28° (mean 6.9°). In most cases, three torsion planes were found, as in asymptomatic subjects; the rotation of these planes was very disparate.

Conclusions and discussion

Lenke 5C curves could be represented in a variety of ways. However, to properly analyse and treat these curves today, the 3D representations of idiopathic scoliosis must enter into our daily practice.

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References

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