Scoliosis

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Oral presentation

A comprehensive model of idiopathic scoliosis (IS) progression, based on the patho-biomechanics of the deforming "three joint complex"

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Introduction

It was previously postulated that the intervertebral disc wedging is a significant progressive factor for mild idiopathic scoliosis (IS) curves. The present report introduces an innovative comprehensive model of IS curve progression based on intervertebral disc diurnal variation and the subsequent patho-biomechanics of the deforming "three joint complex".

Methods and materials

Throughout the day and night, due to sustained loading and unloading, the wedged intervertebral disc space in the scoliosis patient expels fluid and reabsorbs it more on the convex side. The convex side of the disc sustains a greater amount of cyclic expansion than the concave side.

Results

Consequently, the imposed convex-wise, asymmetrically concentrated cyclical loads on the adjacent immature vertebral end plates and posterior elements of the spine lead to asymmetrical vertebral growth. More specifically the loading on the two facet-joins asymmetrically increases during the day, as the wedged disc space narrows due to expelled water and it asymmetrically decreases during the night, as the disc space swells due to reabsorbed water.

Discussion

This 24 hour period of cyclic asymmetric loading leads both to asymmetric growth of the end plates and wedging of the vertebral bodies, and to similarly asymmetric growth of the pedicles and arches posteriorly as an effect of Hüeter-Volkmann law. It is well described that the pedicle in the convex side is more elongated than in the concave side and the facet joint larger respectively.

Significance

The proposed model may help to explain the beneficial effects of exercises, night time bracing in idiopathic scoliosis and of fusionless surgery with staples for progressive IS [1-3].

References

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