Scoliosis

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Differences in measures of full-torso surface topography among healthy teenagers are independent of growth indicators

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Introduction

Surface topography (ST) has been proposed to monitor changes in spinal and rib cage deformity in adolescent with idiopathic scoliosis. The changes in ST parameters used to monitor scoliosis should be related to scoliosis progression and not to changes in torso shape occurring with growth. The objective was to determine the correlation between growth indicators and full-torso surface topography parameters in healthy teenagers.

Materials and methods

We included 67 pain-free healthy volunteers (49% females), 10 to 18 years old, with a body mass index of 19.8±2.7kg/m^2, and scoliometer reading of 3.2° ±1.7°. Four Minolta 910 Laser Scanners and a positioning frame were used to record ST scans. One evaluator positioned subjects with arms at 30° of elevation, marked 15 landmarks, and scanned twice. ST parameters from both scans were extracted in Matlab by one evaluator digitizing landmarks and averaged. Age, height, and weight were self-reported. For 6 published parameters, we calculated the 10th to 90th percentile range for the values extracted from 54 cross-sections of the torso. The Global apparent asymmetry and 7 new angle measures representing scapula position and rib cage shape were also extracted. Pearson correlations were estimated between growth indicators (age, height, weight and BMI) and ST parameters.

Results

Only 7 of 56 possible correlations between growth indicators and surface topography reached significance. Significant coefficients varied between r= -0.27 and 0.34. Growth indicators explained at best 11.6% of the variance in the ST parameters. Regression diagnostics and scatter plots identified 1 to 6 influential subjects responsible for the significant correlations.

Discussion

Our results suggest that changes in the ST parameters in growing teenagers should be interpreted as NOT related to growth and may represent scoliosis progression. The results from this crosssectional study support the validity of full-torso ST parameters tested. A longitudinal study is needed to confirm these findings.

Conclusion

Common and newly proposed full-torso ST parameters were not influenced by growth indicators. Findings may help interpret changes in ST in patients with scoliosis.

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