ABSTRACT

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RASTERSTEREOGRAPHIC BACK SHAPE ANALYSIS IN IDIOPATHIC SCOLIOSIS AFTER ANTERIOR CORRECTION AND FUSION

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Objective. To determine the accuracy of rasterstereographic three-dimensional back surface analysis and reconstruction of the spine in cases of severe idiopathic scoliosis treated by anterior correction and fusion.

Design. Comparison of digitized radiographic curves and rasterstereographic curves by best fit superimposition and calculation of root mean square differences as parameters of similarity.

Background. Rasterstereography has been proven to be accurate in scoliosis up to 50° Cobb angle. Since 1989 the device is in clinical routine use for non-operatively treated patients and reduces the need for otherwise indispensable radiographs significantly.

Methods. Fifty-two patients with severe idiopathic scoliosis with Cobb angles up to 88° were examined rasterstereographically and radiographically. Forty-eight preoperative anterior-posterior radiographs and 101 postoperative anterior-posterior radiographs were digitized.

Radiographic and rasterstereographic curves were compared and the root mean square differences were calculated as parameters of precision of rasterstereographic reconstruction.

Results. Accuracy of rasterstereography in idiopathic scoliosis with Cobb angles between 50° and 88° is satisfactory. The root mean square difference of the radiographic and rasterstereographic curves was 6.4 mm for lateral deviation and 4.5° for vertebral rotation. After anterior scoliosis surgery the precision of the device is good. The root mean square difference for lateral deviation was 3.4 mm and 3.2° for rotation. Considering both groups an average root mean square of 4.7 mm and 3.7° was calculated.

Conclusions. Accuracy in severe scoliosis up to 88° Cobb angle was satisfactory. The results of this first evaluation of surgically treated severe scoliosis showed a good accuracy after anterior surgery.

The system can be used for postoperative follow up examinations and may reduce the number of X-rays considerably. In contrast to radiography, C.T. or M.R.I. rasterstereography provides an objective quantification and documentation of the postoperative cosmetic improvement of the back shape in standing posture.

Relevance statement. Based on the findings of this study, rasterstereography in future enables both objective quantification of cosmetic improvement and significant reduction of X-rays in idiopathic scoliosis with Cobb angles higher than 50° before and after anterior surgical correction and fusion.

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