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How cervical and cervicothoracic scoliosis take influence on the atlanto-axial joint

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Scoliotic deformities are usually compensated by secondary curves. In patients with cervical and cervicothoracic scoliosis, we observed lateral translation (dislocation) within the atlantoaxial joint. The aim of our study was to investigate whether there is a correlation between the atlantoaxial dislocation (CAAD) and scoliosis parameters in patients with cervical or cervicothoracic scoliosis.

Retrospective analysis based on computed tomography and preoperative X-rays of patients with cervical and cervicothoracic scoliosis with an apex between C4 and T6.

17 patients, mean age 7.25, 9 girls, 8 boys. The Cobb angle of the Main curve (CW-MC) and cervical countercurvature (CW-C) T1-, C2- and UEV (upper end vertebra) tilt were measured. The CAAD was measured on coronal CAT scans and defined as difference of distances of the lateral masses to the midline of the axis (Fig. 1). A convex displacement was declared as a positive value and a concave displacement as a negative value. Statistics were performed using SPSS. Pearson correlation (r) for parametric analysis. $P < 0.05$.

An atlantoaxial dislocation towards to convexity of the scoliosis was typically seen; mean CAAD was $3 \text{ mm} \pm 3.7 \text{ mm}$. Mean CW-MC was $46^\circ \pm 13^\circ$, mean CW-C $16^\circ \pm 9.6^\circ$, mean T1 tilt $17^\circ \pm 8.8^\circ$, mean C2 tilt $9^\circ \pm 8.8^\circ$, mean UEV tilt $24^\circ \pm 7.2^\circ$. High linear correlation between the CAAD and the CW-MC ($r = 0.784$, $p < 0.001$), and the C2 tilt ($r = 0.745$; $p < 0.001$), and the UEV tilt ($r = 0.519$; $p < 0.033$). No correlation between CAAD and both CW-C and T1 tilt.

Children with cervico- or cervicothoracic scoliosis tend to have a dislocation within the atlantoaxial joint towards the convexity of the scoliosis. This may be seen as a compensation mechanism to horizontalize gaze. Severe or progressive CAAD may result in a destruction of the atlantoaxial joint including severe complaints. In future studies in scoliosis research AAD might be a useful additional radiographic parameter.

Fig. 1: How we measured CAAD.

Fig. 1

