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The influence of patient positioning on the measurement of cervical sagittal balance parameters in conventional radiographs: A systematic review

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Background: Cervical sagittal balance parameters are important to assess risk factors and outcomes in cervical spine surgery. In current literature, the normative values of these parameters vary highly between studies. This variability might be attributed to different patient positioning.

Research question: The primary aim was to review the literature on the impact of patient positioning on the measurement of cervical sagittal balance parameters on X-rays.

Design: A systematic review was performed.

Methods: A search was carried out in PubMed, Embase, Cochrane Library, Web of Science, and CINAHL. The primary outcome was the variability in cervical lordosis (CL) between positions. The secondary outcomes were the variability in C2-C7 sagittal vertical axis (SVA), C0-C2 lordosis, C0-C7 angle, McGregor slope, chin-brow vertical angle (CBVA), T1 slope (T1S), neck tilt (NT), and C7 SVA between positions. The quality of the included articles was assessed with the QUADAS-2 tool.

Results: Out of 16,861 screened articles, seven were eligible for inclusion. Six studies compared cervical sagittal balance parameters between two positions, and one between three positions. In all studies, statistically significant differences in the abovementioned outcomes were observed with altered positions. A significant decrease in CL was described in four studies with fixation of the head and elevation of the arms compared to the natural standing or sitting position, with values ranging from 17.2 to -3.5 degrees.

Discussion: Studies investigating the impact of patient positioning on the measurement of cervical sagittal balance parameters are scarce. As positioning significantly influences the measurement of cervical sagittal balance, standardization of position is imperative. This also raises questions about the comparability of outcomes in previously published studies.