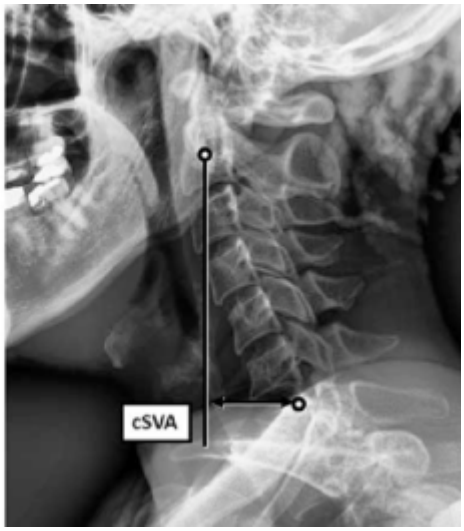
# C2-C7 sagittal vertical axis

- The Influence of Cervical Ossification of the Posterior Longitudinal Ligament on Retro-odontoid Soft Tissue Thickness and Cervical Sagittal Balance
- Impact of T1 Slope Visibility on Cervical Sagittal Alignment: A Comparative Study of Radiographic Parameters According to T1 Slope Visibility
- The Impact of Atlantoaxial Intra-Articular Fusion on Cervical Spine Curvature and Sagittal Balance
- How does cervical and cervicothoracic alignment impact horizontal gaze?
- Outcomes of Conservative Versus Surgical Treatment of Dropped Head Syndrome in a Single Institution: A Case Series and Review of the Literature
- Biceps involvement and degree of motor deficit at diagnosis are independently predictive of timing of postoperative C5 palsy recovery
- Comparison of sagittal measurements of cervical spine in spondylosis patients between Magnetic Resonance Imaging and Radiograph
- The influence of body posture on cervical alignment measured in the sagittal plane on conventional radiographs: a systematic review

see also C2-C7 lordosis


Cervical spine is part of the spine with the most mobility in the sagittal plane. It is important for surgeons to have reliable, simple and reproducible parameters to analyse the cervical.

MATERIAL AND METHOD: This study is a systematic review and a critique of current parameters to help improve the study of cervical spinal balance. We conducted a systematic search of PUBMED/MEDLINE for literature published since January 2014. Only studies written in English and containing abstracts were considered for inclusion. The search performed was: «C7 slope» OR «T1 slope» OR «C2C7 offset» OR «C2C7 lordosis» OR «cervical SVA (sagittal vertical axis)» OR «TIA (thoracic inlet angle)» (Lee et al., J Spinal Disord Tech 25(2):E41-E47, 2012) OR «SCA (spino-cranial angle)». Exclusion criteria were purely post-operative and cadaveric analysis, studies performed with CT scan or MRI, studies on adolescent idiopathic scoliosis, traumatology studies and no standing analysis of the cervical spine. Relevance was confirmed by investigators if cervical parameters was a major criteria of the study.

RESULTS: 138 articles were found by the electronic search. After complete evaluation 20 articles were selected. The large majority of papers used the same parameters C2_C7 lordosis, C2-C7 SVA, T1 slope

or C7 slope and T1 slope/cervical lordosis mismatch. Janusz reported a new parameter using a retrospective cohort of patient with cervical radiculopathy: the TIA (thoracic inlet angle). Le Huec reported an other new parameter based on a prospective study of asymptomatic volunteer: the spino-cranial angle (SCA). This parameter is highly correlated with the C7 slope and the cervical lordosis. Other studies reported parameters that are more global balance analysis including the cervical spine than cervical spine balance itself.

The most important parameters to analyse the cervical sagittal balance according to the literature available today for good clinical outcomes are the following: C7 or T1 slope, average value 20°, must not be higher than 40°. cSVA must not be less than 40°C (mean value 20 mm). SCA (spine cranial angle) must stay in a norm (83° ± 9°). Future studies should focus on those three parameters to analyse and compare pre and post op data and to correlate the results with the quality of life improvement [1)].

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The relative quality-of-life burden of cervical and thoracolumbar deformities have never been compared with each other. This may have significant implications when deciding on the appropriate treatment intervention for patients with combined thoracolumbar and cervical deformities.

METHODS: When defining CD C2-C7 sagittal vertical axis (SVA)>4 cm was used while a C7-S1 SVA>5 cm was used to defined thoracolumbar deformity. Patients with both SVA criteria were defined as “combined.” Primary analysis compared patients in the different groups by demographic, comorbidity data, and quality-of-life scores [EuroQOL 5 dimensions questionnaire (EQ-5D)] using t tests. Secondary analysis matched deformity groups with propensity scores matching based on baseline EQ-5D scores. Differences in disease-specific metrics [the Oswestry Disability Index, Neck Disability Index, modified Japanese Orthopaedic Association questionnaire (mJOA)] were analyzed using analysis of variance tests and post hoc analysis.

RESULTS: In total, 212 patients were included in our analysis. Patients with CD only had less neurological deficits (mJOA: 14.6) and better EQ-5D (0.746) scores compared with patients with combined deformities (11.9, 0.716), all P<0.05. Regarding propensity score-matched deformity cohorts, 99 patients were matched with similar quality-of-life burden, 33 per deformity cohort. CD only patients had fewer comorbidities (1.03 vs. 2.12 vs. 2.70; P<0.001), whereas patients with combined deformity had more baseline neurological impairment compared with CD only patients (mJOA: 12.00 vs. 14.25; P=0.050).

Combined deformity patients were associated with the lowest quality-of-life and highest disability. Furthermore, regarding deformity cohorts matched by similar baseline quality-of-life status (EQ-5D), patients with combined deformities were associated with significantly worse neurological impairments. This finding implies that quality of life may not be a direct reflection of a patient's disability status, especially in patients with combined cervical and thoracolumbar deformities.

LEVEL OF EVIDENCE: Level III [2)].

1)

2)

Passias PG, Poorman GW, Lafage V, Smith J, Ames C, Schwab F, Shaffrey C, Segreto FA, Horn SR, Bortz CA, Varlotta CG, Hockley A, Wang C, Daniels A, Neuman B, Hart R, Burton D, Javidan Y, Line B, LaFage R, Bess S, Sciubba D; ISSG. Cervical Versus Thoracolumbar Spinal Deformities: A Comparison of Baseline Quality-of-Life Burden. Clin Spine Surg. 2018 Oct 26. doi: 10.1097/BSD.0000000000000743. [Epub ahead of print] PubMed PMID: 30371600.