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Editorial

Significance of Atlantoaxial and Subaxial Spinal Instability in Cervical Spinal Spondylosis: Commentary on "Clinical Impact and Correlations of Odontoid Parameters Following Multilevel Posterior Cervical Fusion Surgery"

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See the article "Clinical Impact and Correlations of Odontoid Parameters Following Multilevel Posterior Cervical Fusion Surgery" via https://doi.org/10.14245/ns.2244604.302.

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Standing posture has unique implications for human spine. Facetal articulation forms the fulcrum of activity for a large part of muscle bulk of the nape of neck and back that maintains the erect spinal posture. On the other hand, only a relatively few strands of muscles are associated with the vertebral body and intervertebral disc. Our articles discuss that the disc (and the odontoid process) is the brain of spinal movements, whilst the brawn of the movements are the muscles.[1] Intervertebral disc regulates spinal movements and mimic in actions an opera conductor who plays all music without holding any instruments in hand.

The conductor of an orchestra (the disc) doesn't make a sound. He depends, for his power on his ability to make other people (muscles) powerful – Benjamin Zander

For several decades 'old' age or injury related affection of the disc, reduction in its water content and its herniation has been incriminated as the nodal point of genesis of cascade of secondary events that are grouped under the term spinal degeneration. 'Pathological' issues related to spinal degeneration include bulging of the disc into the spinal canal, osteophyte formation, ligamentum flavum hypertrophy, bone fusion, and listhesis of the facets. The eventual outcome is reduction in the spinal canal and neural foraminal dimensions that results in neural compression and related symptoms of radiculopathy and/or myelopathy.

In 2010, we proposed that muscle weakness related to their injury, disuse or abuse results in telescoping or listhesis of the facets or in 'vertical' spinal instability and forms the point of genesis of spinal spondylosis.[2-5] Identification of instability of the facets on dynamic imaging is difficult if not impossible. Our studies conclude that all the so-called 'pathological alterations' in spinal degeneration are secondary, naturally protective, indicators of segmental instability and are potentially reversible following spinal stabilization.

Atlantoaxial joint is the most mobile joint of the spine. Its flat and round surface makes it prone to develop instability. It appears that atlantoaxial instability is 'frequently' associated

with multisegmental cervical spinal degeneration.[6-8] Such atlantoaxial instability is more often associated in patients presenting with symptoms related to severe myelopathy.[9] As the instability is more often of central or axial variety, there may not be compression of the dura or neural structures by the odontoid process. Craniovertebral junction degenerative alterations secondary to atlantoaxial instability are relatively common and probably a neglected clinical entity.[10]

Essentially, instability is the issue in spinal degeneration and stabilization is the treatment.[11,12] 'Decompression' by resection of bone, soft tissue, osteophytes or intervertebral disc may not be necessary. In selected cases, inclusion of the atlantoaxial joint in the fixation construct is critical for success of surgery.

Our articles suggest that ossification of posterior longitudinal ligament is a consequence of longstanding spinal instability that more often includes atlantoaxial instability.[13,14] Spinal deformities are secondary events that originate from multisegmental spinal instability. Hirayama disease is also probably an outcome of multisegmental cervical spinal instability.[15]

Craniovertebral junction has been essentially ignored in the management of degenerative spinal disease. The authors of this article have identified alterations in the angulation of the odontoid process and in the C2 slope in cases with multisegmental cervical spondylotic myelopathy.[16] These parameters indicate alterations in alignment and spinal balance and are additional evidences that indicate atlantoaxial instability. The authors have performed spinal stabilization from C3 below. It is unclear if they performed simultaneous decompression or not.

As our experience in the field is growing, we realize that inclusion of atlantoaxial joint in the fixation construct is essential in a large majority of these cases where there is multisegmental spinal instability related spinal degeneration.[6-9] We have recently advocated an alternative technique of atlantoaxial stabilization that involves C2–3 transarticular fixation and sectioning of the muscles attached to the C2 spinous process.[17] This technique stabilizes the C2 bone and the odontoid process, avoids direct insertion of the screw in the facet of atlas and retains the rotatory movement initiated by the muscles attached to the large transverse process of the atlas bone. Inclusion of C2 spinal vertebra in the fixation construct appears to be essential in a majority of cases of multisegmental spinal degeneration.

Understanding that instability is the issue and stabilization is the treatment can greatly influence the treatment for spinal degeneration. Atlantoaxial segmental degeneration is a relatively common clinical event and is often associated with subaxial spinal instability. Identification of unstable spinal segments on the basis of clinical and radiological parameters and direct observations during surgery can indicate the levels of spinal segments that need stabilization.

Conflict of Interest: The author has nothing to disclose.

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Title: Mother and Child
Year: 1921
Artist: Pablo Picasso

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