Evaluation of Cervicomedullary Compression Around the Craniovertebral Junction: Commentary on “Measurement of Deformity at the Craniovertebral Junction: Correlation of Triangular Area and Myelopathy”

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The craniovertebral junction (CVJ) is the region around the skull base and the upper cervical spine (atlas and axis), along with its neurovascular components, including the brain stem, spinal cord, vertebral artery, and venous plexus. The stability of CVJ is dependent on a robust ligamentous complex and the shape of the bony structures, which are also responsible for much of the axial rotation (C1–2 joint) and flexion-extension movements (C0–1 and C1–2 joint). CVJ pathologies are usually rare and can result in progressive deformity, myelopathy, severe neck pain, and functional disability, such as difficulty swallowing.

In most cases, standard radiographs, computed tomography, and magnetic resonance imaging typically conduct the proper diagnosis of CVJ pathology. However, no one-single method has been recommended to properly diagnose CVJ pathology due to the overlying structures on lateral plain radiographs. Ambiguous landmarks lead to low reliability or consistency for confirming basilar invagination (BI). Accordingly, we must establish a more reliable and consistent method for diagnosing CVJ pathologies.

Many methods for diagnosing BI and CVJ pathology may imply that choosing just one method in clinical circumstances is complicated. These measurements can show variable results due to multiple reasons. First, anatomical landmarks may be ambiguous, thus leading the interpreter to measure different results. Second, measurement errors can be made by the interpreter himself or on the radiographs. The lack of confidence in anatomic landmarks can cause unreliable results, and it is hard to obtain absolute true-lateral radiographs in every patient.

Variations in measurement may lead to a different type of treatment. Therefore, we need to determine how reliable and reproducible these measurements are.
In this article, the novel measurement method of the cord compression around CVJ is well described, and the measurement of triangular area (TA) could indicate the severity of cervicomedullary compression.

Cervical TA is a 2-dimensional volumetric measurement of ventral cord compressive lesion. It is possible to evaluate the exact degree of cervicomedullary compression in patients with CVJ deformity compared to the existing 1-dimensional measurement methods.

Moreover, the change of TA could reflect the effect of surgery, such as the improvement of CVJ alignment, cord decompression, and the resorption of retro-odontoid soft tissue mass.

However, there are several limitations of cervical TA evaluation. First, most CVJ pathologies often accompany mechanical instability, and this instability often causes or exacerbates neurological symptoms, but cervical TA measurement does not reflect the dynamic cord compression.

And cervical TA does not show the cord compressive lesions caused by posterior pathologies. And finally, cervical TA cannot reflect the indirect decompression effect of the C1–2 joint distraction technique.

As introduced by Goel, a C1–2 joint distraction technique has been gaining popularity recently as a possible treatment modality for selected CVJ pathologies, especially for BI. C1–2 joint distraction reduces BI and decompresses indirectly by down-migrating the C2 dens and stretching the retro-odontoid pannus in patients with BI and the retro-odontoid pannus. This technique has several advantages over conventional transoral surgery; the most important of which are indirect reduction and fixation are possible posteriorly for the compressive pathology around the cervicomedullary junction.

However, confirming the indirect cord decompression effect by the cervical TA method could be difficult after C1–2 joint distraction surgery because the length between the clivus and the lower C2 endplate increases even though the degree of anterior spinal cord compression decreases after vertical distraction surgery of C1–2 facet joint.

Despite these disadvantages, this cervical TA measurement method can evaluate the degree of ventral compression more accurately in 2 dimensions, which could be helpful for the pre- and postoperative evaluation of many CVJ pathologies. Of course, it will be necessary to evaluate and confirm the efficacy of this new measurement method for the various types of CVJ disease.

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REFERENCES